

Radio Shack®

R. W. Elliott

Service Manual

TRS-80 LINE PRINTER II

Catalog Number

26-1154A

CUSTOM MANUFACTURED IN U.S.A. FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

26-1154A

NOTE

The purpose of this manual is twofold. It provides the owner with complete adjustment procedures and it provides Radio Shack Service Personnel with complete repair procedures.

If you are not technically inclined, do not attempt to repair your Printer. If you do, you'll void your warranty.

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SECTION 1

INTRODUCTION

1.1 SCOPE

This manual contains detailed information on the installation, theory of operation, maintenance, and adjustment of the Radio Shack Line Printer II dot-matrix printer. The contents of the manual are for use by qualified service personnel who have been trained to maintain and repair electronic and electromechanical equipment. Care must be exercised when servicing the printer to avoid possible damage to the printer or injury to personnel.

1.2 GENERAL DESCRIPTION

The Line Printer II is an operationally simple, compact, microprocessor controlled, dot-matrix, impact printer. The unit prints 7x7 dot matrix characters at 10 or 16.7 characters per inch in line lengths up to 8 inches at a rate of 100 characters per second. The printer features three-way paper handling.

- (1) 9 1/2-inches (9-inches pin-to-pin) wide standard computer fanfold forms, with fixed position pins to ensure pinfeed paper registration. The paper can be multipart up to three parts.
- (2) Rolled paper, 3 1/2-to 8 1/2-inches wide, 1-inch core and up to 5-inches diameter. The printer includes a roll paper holder. A built-in rip-and-read cutting edge allows easy removal of paper. The first line of following page is printed within five lines of tear edge. Two ply paper may be used with operator attendance.
- (3) Single sheets of 8 1/2-inch wide paper, hand fed as with an ordinary typewriter.

The printer contains six dip switch selectable character sets of the following countries: U.S.A., France, United Kingdom, Germany, Italy and Sweden/Finland. Characters are printed at up to 80 characters per line in the 10 cpi character density and up to 132 characters per line in the 16.7 cpi character density. Elongated characters are double-width characters and can be printed in either the 10 cpi or 16.7 cpi character density.

Other significant features include:

- (1) Reliable free-flight head.
- (2) Microprocessor technology.
- (3) Full line buffer.
- (4) Fast carriage return at 10 inches per second.
- (5) Special line feed buffer for host-controlled forms control.
- (6) Compact size (5-inches high x 14 1/2-inches wide x 11-inches deep).

1.3 PHYSICAL DESCRIPTION

A printer mechanism, printed circuit board, cover assembly set, and holder for roll paper comprise the major assemblies of the printer. See Figure 1-1.

The three cover set provides structural support and consists of a base cover, a body cover, and a top cover. The base cover supports the printed circuit board and the printer mechanism. The body cover fits over and around the base cover and contains a flat tray for the ribbon. It also houses the ribbon drive motor and gear mechanism. The top cover snaps into the body cover and prevents contact with the print mechanism and electronics. Printed paper exits through a slot in the rear of the cover which has a serrated edge to provide a tear bar for removing printed pages.

The printed circuit board (pcb) contains all the printer electronics including an "on board" DC power supply with an input transformer, filter capacitors, and fuse. The pcb fits underneath the printer mechanism and is approximately the same size as the bottom cover although the electronic circuitry requires only about one-third of this area. This allows the printed circuit input edge card connector, which protrudes from the bottom rear of the printer, to be an integral part of the pcb for increased reliability. It also allows the POWER ON/OFF and ONLINE/OFFLINE switches, which protrude from the bottom front to be mounted directly on the pcb.

The printer mechanism consists of a left and right end plate which secure the carriage assembly shafts and carriage rack, the platen, and the paper feed roller assemblies. A solenoid attached to the left end plate provides the drive for paper movement. The solenoid is mechanically linked by a pawl which engages a ratchet on the paper feed roller. When the solenoid is energized the paper feed roller is rotated incrementally resulting in a forward (upward) movement of paper one-sixth inch (4 mm) or one line.

The carriage assembly is driven back and forth on the carriage shafts by the drive motor pinion gear which engages the rack. The print head is transported along the platen by the motion of the carriage assembly. A flexible cable connects the drive motor and print head solenoids to the pcb.

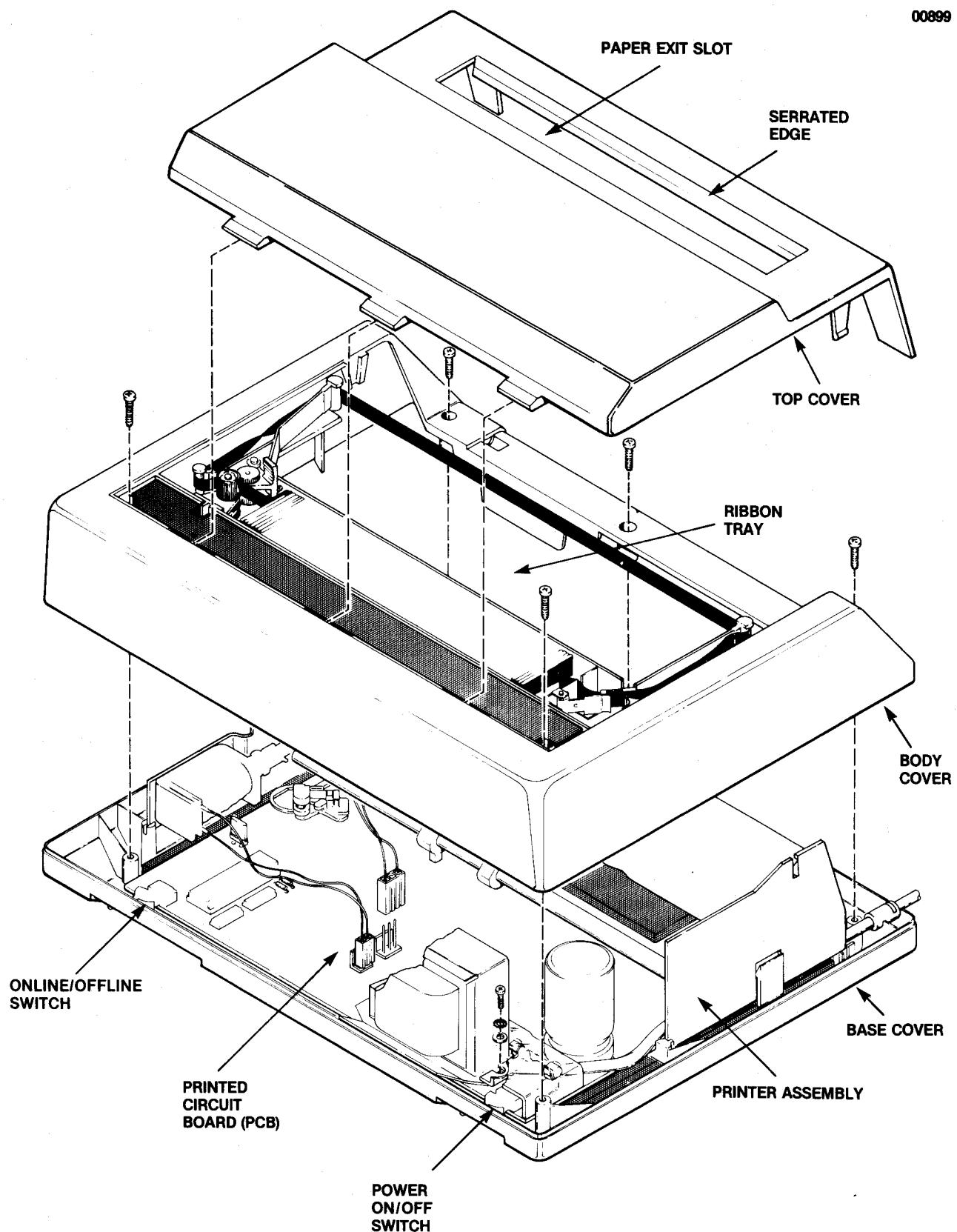


Figure 1-1. PRINTER ASSEMBLIES

1.4 FUNCTIONAL DESCRIPTION

Figure 1-2 is a pictorial diagram of the Line Printer II. All of the logic, control, and power supply circuits are contained on the logic pcb (printed circuit board). The printer employs a microprocessor located on the logic pcb to control printer operation. Under program control the microprocessor controls the receiving of input data from the host device, monitors printer status, initiates and controls movement of the carriage assembly, controls printing by the print head, and controls paper movement. It monitors the position of the print head at all times and provides printer status information to the host device.

The host device transmits 8-bit parallel (ASCII) data and a data strobe signal to the printer logic pcb. Control of the transmission of data between the host device and the printer accomplished using the acknowledge (ACK), BUSY, and DEMAND signals. Data transmitted by the host device is strobed into the logic pcb circuits by the DATA STROBE signal. The printer responds by sending a BUSY signal to host device indicating printer is operating on the data. After processing the data the printer sends an acknowledge signal to the host and the BUSY signal is discontinued. The DEMAND signal is the inverse of the BUSY signal and when present indicates to the host that the printer is not busy and can accept data.

The input data applied to the printer consists of character data and control code data. Character data is stored in an input buffer until the data is to be printed. Control codes are interpreted as instructions by the printer and provide the means for host control of the printer.

Input character data is stored in the input buffer until the buffer is full, or until a carriage return (CR) control code is received. A CR control code is interpreted as a print command by the printer. Receipt of a CR control code by the printer initiates printing of the contents of the input buffer. Printing is also initiated when the input buffer becomes full. In the 10 cpi mode buffer full is 80 characters while in the 16.7 cpi mode buffer full is 132 characters.

Characters are printed by selectively energizing the print head solenoids which in turn activate the pins of the print head which are arranged in a column. As the print head is moved across the paper the appropriate pins are activated driving them against the ribbon paper, and platen to form characters in a 7x7 dot matrix.

The print head is mounted on the carriage assembly. Printing occurs only when the carriage is moved from left to right. When the printer is turned on and after printing each line, the print head is moved to the left side of the printer mechanism. The carriage assembly is driven by a reversible dc motor mounted on the assembly. When a print command (CR) is received the motor is energized, the carriage assembly is moved in the forward direction, and the contents of the input buffer is printed. As the carriage assembly moves, an encoder wheel (which has magnets imbedded in it) is rotated. The column sensor (Hall effect device) senses when each of the magnets moves past it and generates column sense signals which are used to synchronize the print head solenoids. Upon completion of printing a line of data, the polarity of the dc voltage applied to the carriage drive motor is reversed and the carriage assembly is moved to the left side of the printer.

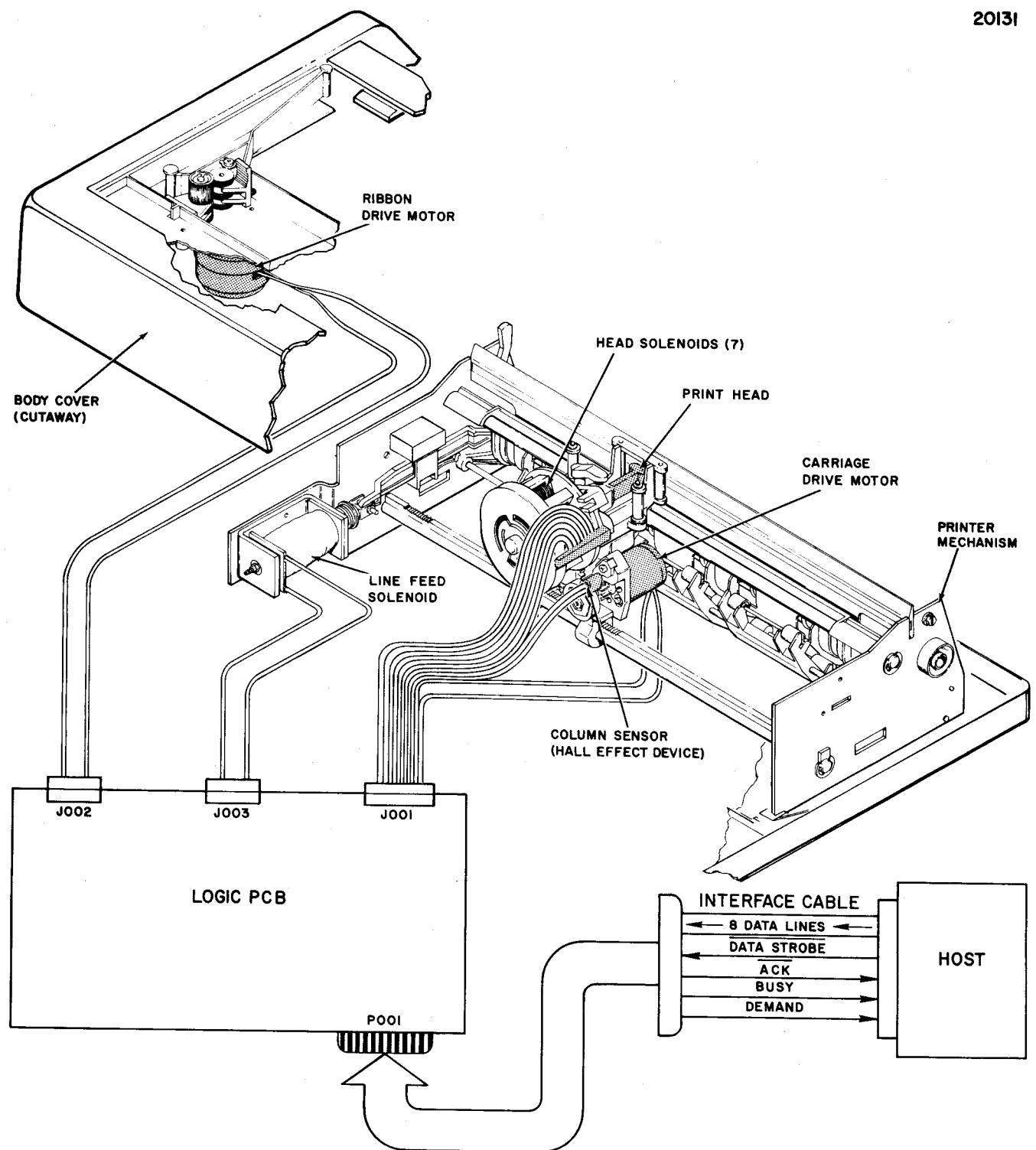


Figure 1-2. PICTORIAL DIAGRAM

Paper is automatically moved up one line after each line is printed or whenever a line feed (LF) control code is sent by the host device. When a line feed is to be executed, the line feed solenoid is momentarily energized which causes the paper feed roller to move the paper one line. The automatic line feed function may be disabled. However, if this function is disabled, the host device must transmit at least one LF command prior to sending a print command (CR) or a full line of character data or overprinting will occur.

Line feed (LF) commands may be intermixed with input character data and multiple line feed commands may be sent by the host device. A special line feed buffer is provided which can store up to 255 pending line feeds. The initial line feed received causes an immediate advance of one line. Because of the time required to execute a line feed is relatively long (160 milliseconds) with respect to the input data rate (9300 characters per second) subsequent line feeds are stored as a count in the line feed buffer. All line feeds are executed prior to printing the line of data.

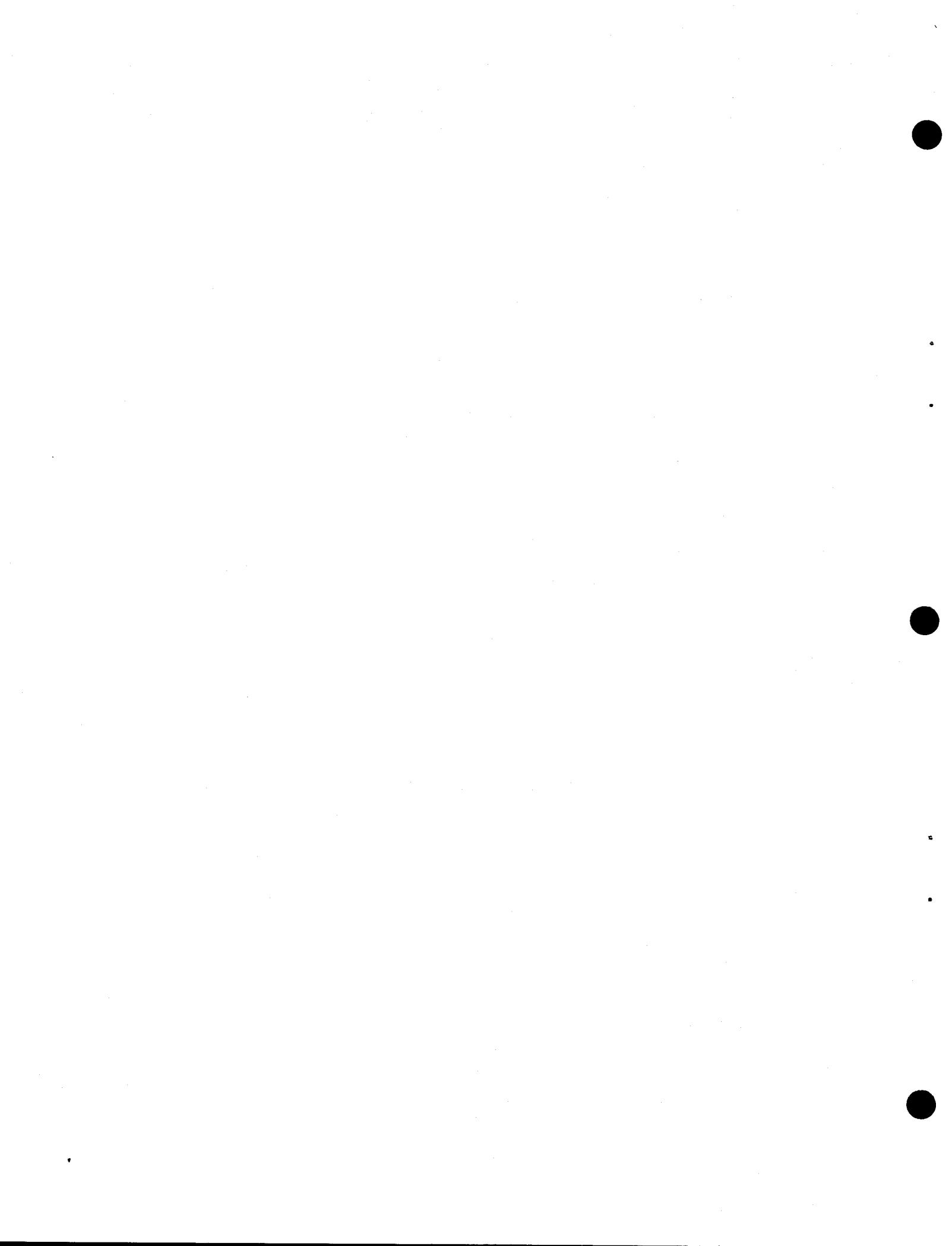
The printer uses a Mobius strip ribbon configuration which allows printing on the upper and lower portions of the ribbon on alternate passes of the ribbon thereby increasing ribbon life. The ribbon drive motor (ac) is energized at all times except when the print head is at the left-most position. This insures proper movement of the ribbon through the ribbon path and compensates for the movement of the print head in both forward and reverse directions.

1.5 SPECIFICATIONS

The specifications for the Line Printer II are contained in Table 1-1.

Table 1-1. Specifications

Ribbon (12 per box)	15-yard zip pack Mobius strip
Paper	Cut Sheets (8 1/2-inches wide) Rolls (3 1/2-inches to 8 1/2-inches wide x 5-inches diameter with 1-inch Core), 2 ply Fanfold (9-inches pin-to-pin), 3 ply
Printing Speed	28 lines per minute (lpm) at 80 characters per line (cpl) or 74 lpm at 20 cpl left justified
Characters Per Line	80 maximum @ 10 cpi/132 maximum @ 16.7 cpi
Print Width	8 inches maximum (204 mm)
Character Structure	7x7 Dot Matrix
Line Feed Buffer	Capacity for 255 pending line feeds.
Line Feed Repeat Rate	9 linefeeds/second
Vertical Spacing	6 lines per inch
Horizontal Spacing	10 characters per inch/16.7 characters per inch
Parallel Data Input Connector	40-pin PC edge connector
Parallel Interface Cables	Maximum length: 10 feet Type: Twisted pair Gauge: 26 AWG
Code	Standard ASCII-2
Character Set	Dip switch selectable for U.S.A., France, United Kingdom, Germany, Italy and Sweden/Finland
Input Character Format	8 parallel data bits.
Input Data Rate	Up to 9300 characters/second.
Input Voltage/Frequency	120 Vac <u>+10%</u> 60 Hz
Power Requirements	100 Watts
Size	14 1/2-inches W x 11-inches D x 5-inches H; (368 mm) x (279 mm) x (127 mm)
Weight	12 pounds (5.4 Kg)



SECTION 2 INSTALLATION

2.1 INSPECTION

Visually inspect the printer for signs of damage received during shipment. Notify the common carrier immediately of any discrepancies.

NOTE

Any attempt to operate a damaged printer voids the warranty and may cause further damage.

2.2 INTERFACE INFORMATION

2.2.1 PRINTER INTERFACE CONNECTOR

A 40-pin printed circuit edge-card connector located at the left rear of the printer provides the means for connecting the printer to an input device. The physical and electrical characteristics, pin orientation, and connector pin-outs of the printer interface connector are shown below.

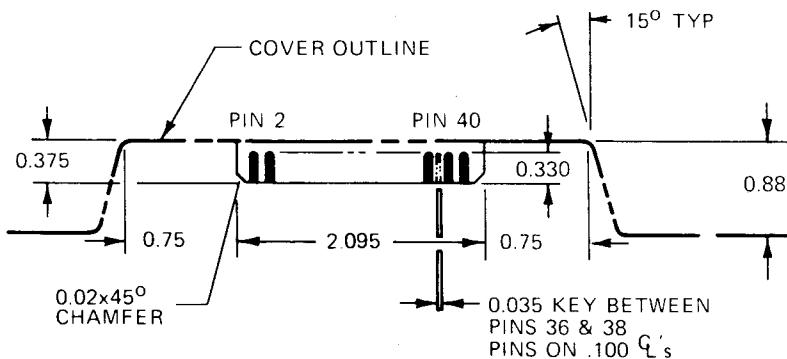


Figure 2-1. TOP VIEW OF PRINTER INTERFACE CONNECTOR

2.2.2 INTERFACE CONNECTOR PIN-OUTS

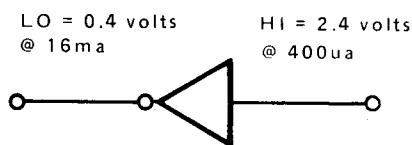
Table 2-1 shows interface connector pin numbers and the input and output signals at each pin.

Table 2-1. Printer Interface Connector Pin-Outs

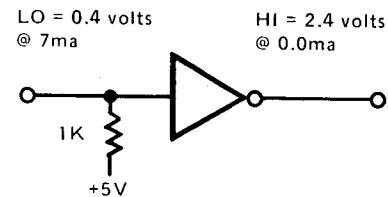
PIN	SIGNAL	PIN	SIGNAL
1	DATA STROBE	2	TWISTED PAIR GROUND (DATA STROBE)
3	DATA BIT 1	4	TWISTED PAIR GROUND (DATA BIT 1)
5	DATA BIT 2	6	TWISTED PAIR GROUND (DATA BIT 2)
7	DATA BIT 3	8	TWISTED PAIR GROUND (DATA BIT 3)
9	DATA BIT 4	10	TWISTED PAIR GROUND (DATA BIT 4)
11	DATA BIT 5	12	TWISTED PAIR GROUND (DATA BIT 5)
13	DATA BIT 6	14	TWISTED PAIR GROUND (DATA BIT 6)
15	DATA BIT 7	16	TWISTED PAIR GROUND (DATA BIT 7)
17	DATA BIT 8	18	TWISTED PAIR GROUND (DATA BIT 8)
19	ACKNOWLEDGE (ACK)	20	TWISTED PAIR GROUND (ACKNOWLEDGE)
21	BUSY	22	TWISTED PAIR GROUND (BUSY)
23	ALWAYS LOGIC 0 (GROUND)	24	TWISTED PAIR GROUND (DEMAND)
25	ALWAYS LOGIC 1 (+5V)	26	NOT USED
27	SIGNAL GROUND	28	ALWAYS LOGIC 1
29	NOT USED	30	GROUND
31	SIGNAL GROUND	32	PIN 32 JUMPERED TO PIN 34
33	CHASSIS GROUND	34	FOR SENSING PRINTER CONNECTED
35	+5V SIGNAL (P.S. ON)	36	DEMAND
37	NOT USED	38	NOT USED
39	NOT USED	40	NOT USED

2.2.3 INTERFACE DRIVERS AND RECEIVERS

Figure 2-2 illustrates the requirement for drivers and receivers used in the interface. All levels are TTL compatible.



DRIVER



RECEIVER 00844

All input/output signals are TTL compatible.

Figure 2-2. INTERFACE DRIVERS AND RECEIVERS

2.2.4 INTERFACE COMMUNICATION AND TIMING

The paragraphs below describe the interface communication signals. Figure 2-3 illustrates the interface timing.

Data Strobe (Host Generated)

The data strobe (DATA STROBE) signal is a negative going pulse which is used to transfer the incoming data from the host into the electronic circuitry of the printer. The pulse duration must be a minimum of one microsecond. The relationship of the leading and trailing edges of the DATA STROBE signal with the leading and trailing edges of the input data signals must be as shown in the interface timing diagram (See Figure 2-3).

Data Lines (Host Generated)

The eight input data lines provide the means to transfer bits 1 through 8 of the ASCII character data and control code data. The presence of logic 1 bits is indicated by positive going signals.

Acknowledge (Printer Generated)

The acknowledge (ACK) signal is a negative going signal which indicates that the printer has processed the latest data transferred from the host. No new data can be sent to the printer until the leading edge of the ACK pulse has occurred. If the printer receives a carriage return (CR) control code, or if the printer print buffer or line feed buffer becomes full, the acknowledge pulse will not occur until after the line has been printed or until the line feed buffer becomes only partially full.

Busy (Printer Generated)

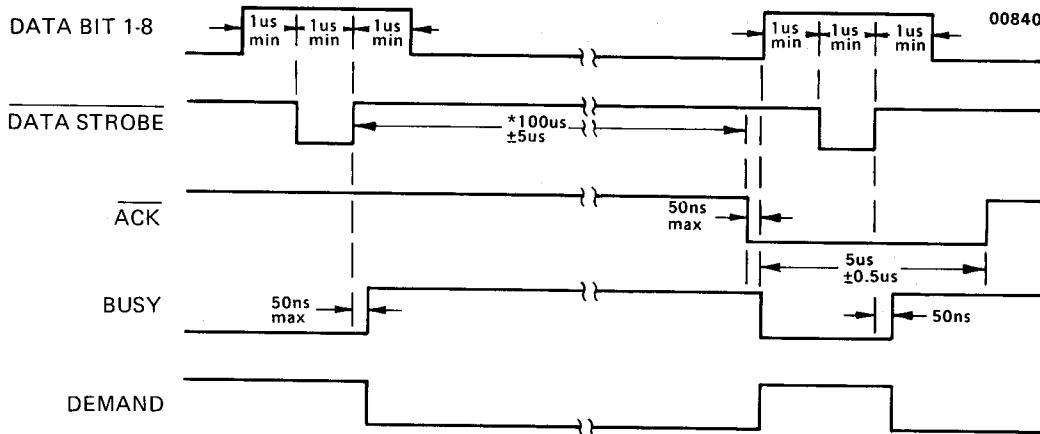
The BUSY signal is a positive going signal which indicates the time when the printer cannot accept new data. The BUSY signal goes positive on the trailing edge of every data strobe pulse and remains high until the leading edge of the acknowledge pulse. No new data can be sent to the printer while the BUSY signal is high.

Demand (Printer Generated)

The DEMAND signal is the inverse of the BUSY signal. When high (positive), the DEMAND signal indicates that the printer can accept data.

+5V Signal (Printer Generated)

The +5V signal (I/O Connector, Pin 35) indicates that the +5V power supply is operating in the printer. The +5V signal is intended to be used for signal purposes only and it must not be used to provide power to external equipment.



* 100 usec is for data reception and line feeds that do not fill the line feed buffer. For line feeds that fill the buffer, the time is 110 msec +10%, -0%. For carriage return codes, the maximum time is 2.6 seconds. In approximately 10% of the data transfer cycles (strobe to ACK cycles) a microprocessor interrupt occurs which extends the busy time from a nominal 100 usec to approximately 200 usec.

Figure 2-3. INTERFACE TIMING

2.2.5 HOST-GENERATED CONTROL CODES

Control code data is sent to the printer along with character code data via the input data lines. Control codes are sent as data, but are interpreted as instructions by the printer. A summary of the control codes and control code sequences recognized by the printer is shown below. Each of the control codes is described in detail in the following paragraphs.

Mnemonic	Decimal	Octal Code	Hex Code	Function
LF	10	012	0A	Full Line Feed Forward
CR	13	015	0D	Print Command
ESC SO	27,14	033,016	1B,0E	Start Elongated Characters
ESC, SI	27,15	033,017	1B,0F	Stop Elongated Characters
ESC, DC3	27,19	033,023	1B,13	Select 10 cpi Character Density
ESC, DC4	27,20	033,024	1B,14	Select 16.7 cpi Character Density

Line Feed (LF) Code

Each line feed (LF) code received by the printer causes the paper to be advanced one line. Line feed codes are received at the same rate as character data (up to 9300 characters per second.) When multiple line feed codes are sent to the printer, the initial line feed code is acted upon immediately and the additional line feed codes are stored in the line feed buffer as a count. If more than 255 lines feeds are received the printer will go BUSY, and no more data can be sent to the printer until pending line feeds have been processed and the line feed buffer is partially full. Line feed codes and character data can be intermixed, however all line feeds in the buffer will be processed before the next line is printed.

Carriage Return (CR) Code

The carriage return (CR) code serves as a print command to the printer. Data is received by the printer and stored in the print buffer until a CR code is received. Upon receipt of a CR code, the contents of the print buffer are printed. If the print buffer is filled, a CR code is generated by the printer and the line is printed. The print head is returned to the left margin after the content of the print buffer is printed.

ESC, SO; ESC, SI Code Sequence and Data Bit 8 Control

The ESC, SO code sequence (or bit 8 logically high) initiates printing of elongated characters (doublewidth characters.) The ESC, SO code sequence may be sent to the printer at any time during the transmission of a line of character data (up to 40 characters.) Reception of an ESC SI code sequence (or bit 8 logically low) causes all data following the code sequence to be printed normal size. The end of a print line terminates printing of elongated characters. The next line of data will be printed as standard-width characters unless an ESC, SO code sequence is received during the transmission of the character data for that line.

ESC, DC1; ESC, DC3 Code Sequence

The primary character density is 10 cpi, selected by the printer logic during initialization, or by ESC, DC3. The ESC, DC4 code sequence selects the 16.7 cpi character density. The print buffer is set to 80 characters for 10 cpi and 132 characters for 16.7 cpi. The 16.7 cpi character density is deselected by sending an ESC, DC3 code sequence or at the end of a print line.

2.2.6 ASCII CODE CHARTS

Figures 2-4 through 2-6 are the ASCII code charts showing the 96 ASCII characters for the six different character sets, the codes for the various characters, and the control codes recognized by the printer.

$b_7 \ b_6 \ b_5$ $B_{i_{ts}}$				$\xrightarrow{\quad}$ $\xrightarrow{\quad}$		0_0_0 0_0_1 0_1_0 0_1_1 1_0_0 1_0_1 1_1_0 1_1_1		0 1 2 3 4 5 6 7		\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow		Column Row			
0	0	0	0	0	NUL	DLE	Space	0	@	P	↓	P			
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q			
0	0	1	0	2	STX	DC2	*	2	B	R	b	r			
0	0	1	1	3	ETX	DC3	*	3	C	S	c	s			
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t			
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u			
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v			
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w			
1	0	0	0	8	BS	CAN	(	8	H	X	h	x			
1	0	0	1	9	HT	EM	)	9	I	Y	i	y			
1	0	1	0	10 (A)	LF	SUB	*	:	J	Z	j	z			
1	0	1	1	11 (B)	VT	ESC	+	;	K	E	k	é			
1	1	0	0	12 (C)	FF	FS	,	<	L	F	l	ù			
1	1	0	1	13 (D)	CR	GS	-	=	M	§	m	è			
1	1	1	0	14 (E)	SO	RS	.	>	N	^	n	..			
1	1	1	1	15 (F)	SI	US	/	?	O	-	o				

CONTROL CODES

STANDARD

A. U.S.A.

$b_7 \ b_6 \ b_5$ $B_{i_{ts}}$				$\xrightarrow{\quad}$ $\xrightarrow{\quad}$		0_0_0 0_0_1 0_1_0 0_1_1 1_0_0 1_0_1 1_1_0 1_1_1		0 1 2 3 4 5 6 7		\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow		Column Row			
0	0	0	0	0	NUL	DLE	Space	0	à	P	‘	P			
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q			
0	0	1	0	2	STX	DC2	*	2	B	R	b	r			
0	0	1	1	3	ETX	DC3	£	3	C	S	c	s			
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t			
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u			
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v			
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w			
1	0	0	0	8	BS	CAN	(	8	H	X	h	x			
1	0	0	1	9	HT	EM	)	9	I	Y	i	y			
1	0	1	0	10 (A)	LF	SUB	*	:	J	Z	j	z			
1	0	1	1	11 (B)	VT	ESC	+	;	K	°	k	é			
1	1	0	0	12 (C)	FF	FS	,	<	L	F	l	ù			
1	1	0	1	13 (D)	CR	GS	-	=	M	§	m	è			
1	1	1	0	14 (E)	SO	RS	.	>	N	^	n	..			
1	1	1	1	15 (F)	SI	US	/	?	O	-	o				

CONTROL CODES

STANDARD

B. FRANCE

Figure 2-4. ASCII CODE CHART

b ₇ b ₆ b ₅ B ₄ B ₃ B ₂ B ₁				Column		0 ₀ ₀	0 ₀ ₁	0 ₁ ₀	0 ₁ ₁	1 ₀ ₀	1 ₀ ₁	1 ₁ ₀	1 ₁ ₁
				Row	Column	0	1	2	3	4	5	6	7
0	0	0	0	0	0	NUL	DLE	Space	0	®	P	↓	P
0	0	0	1	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	2	STX	DC2	*	2	B	R	b	r
0	0	1	1	3	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10 (A)	10 (A)	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11 (B)	11 (B)	VT	ESC	+	;	K	£	k	£
1	1	0	0	12 (C)	12 (C)	FF	FS	,	<	L	\	1	l
1	1	0	1	13 (D)	13 (D)	CR	GS	-	=	M	»	m	»
1	1	1	0	14 (E)	14 (E)	SO	RS	.	>	N	↑	n	→
1	1	1	1	15 (F)	15 (F)	SI	US	/	?	O	-	o	

CONTROL CODES

STANDARD

C. UNITED KINGDOM

b ₇ b ₆ b ₅ B ₄ B ₃ B ₂ B ₁				Column		0 ₀ ₀	0 ₀ ₁	0 ₁ ₀	0 ₁ ₁	1 ₀ ₀	1 ₀ ₁	1 ₁ ₀	1 ₁ ₁
				Row	Column	0	1	2	3	4	5	6	7
0	0	0	0	0	0	NUL	DLE	Space	0	®	P	‘	P
0	0	0	1	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	2	STX	DC2	*	2	B	R	b	r
0	0	1	1	3	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10 (A)	10 (A)	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11 (B)	11 (B)	VT	ESC	+	;	K	ä	k	ä
1	1	0	0	12 (C)	12 (C)	FF	FS	,	<	L	ö	1	ö
1	1	0	1	13 (D)	13 (D)	CR	GS	-	=	M	ü	m	ü
1	1	1	0	14 (E)	14 (E)	SO	RS	.	>	N	^	n	ß
1	1	1	1	15 (F)	15 (F)	SI	US	/	?	O	-	o	

CONTROL CODES

STANDARD

D. GERMANY

Figure 2-5. ASCII CODE CHART

b_7 b_6 b_5 $B_{i_{ts}}$				\rightarrow \rightarrow Column Row		0_0_0	0_0_1	0_1_0	0_1_1	1_0_0	1_0_1	1_1_0	1_1_1
						0	1	2	3	4	5	6	7
0	0	0	0	0		NUL	DLE	Space	0	5	P	Ù	Þ
0	0	0	1	1		SOH	DC1	!	1	A	Q	à	ä
0	0	1	0	2		STX	DC2	*	2	B	R	b	r
0	0	1	1	3		ETX	DC3	£	3	C	S	c	s
0	1	0	0	4		EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5		ENQ	NAK	%	5	E	U	e	ü
0	1	1	0	6		ACK	SYN	&	6	F	V	f	v
0	1	1	1	7		BEL	ETB	'	7	G	W	g	w
1	0	0	0	8		BS	CAN	(	8	H	X	h	x
1	0	0	1	9		HT	EM	)	9	I	Y	i	ÿ
1	0	1	0	10 (A)		LF	SUB	*	:	J	Z	j	z
1	0	1	1	11 (B)		VT	ESC	+	;	K	°	k	ä
1	1	0	0	12 (C)		FF	FS	,	<	L	é	l	ö
1	1	0	1	13 (D)		CR	GS	-	=	M	I	m	ä
1	1	1	0	14 (E)		SO	RS	.	>	N	^	n	ü
1	1	1	1	15 (F)		SI	US	/	?	O	-	o	

CONTROL CODES

STANDARD

E. ITALY

b_7 b_6 b_5 $B_{i_{ts}}$				\rightarrow \rightarrow Column Row		0_0_0	0_0_1	0_1_0	0_1_1	1_0_0	1_0_1	1_1_0	1_1_1
						0	1	2	3	4	5	6	7
0	0	0	0	0		NUL	DLE	Space	0	é	P	è	Þ
0	0	0	1	1		SOH	DC1	!	1	A	Q	à	ä
0	0	1	0	2		STX	DC2	*	2	B	R	b	r
0	0	1	1	3		ETX	DC3	£	3	C	S	c	s
0	1	0	0	4		EOT	DC4	×	4	D	T	d	t
0	1	0	1	5		ENQ	NAK	%	5	E	U	e	ü
0	1	1	0	6		ACK	SYN	&	6	F	V	f	v
0	1	1	1	7		BEL	ETB	'	7	G	W	g	w
1	0	0	0	8		BS	CAN	(	8	H	X	h	x
1	0	0	1	9		HT	EM	)	9	I	Y	i	ÿ
1	0	1	0	10 (A)		LF	SUB	*	:	J	Z	j	z
1	0	1	1	11 (B)		VT	ESC	+	;	K	ä	k	ä
1	1	0	0	12 (C)		FF	FS	,	<	L	ö	l	ö
1	1	0	1	13 (D)		CR	GS	-	=	M	ä	m	ä
1	1	1	0	14 (E)		SO	RS	.	>	N	ü	n	ü
1	1	1	1	15 (F)		SI	US	/	?	O	-	o	

CONTROL CODES

STANDARD

F. SWEDEN/FINLAND

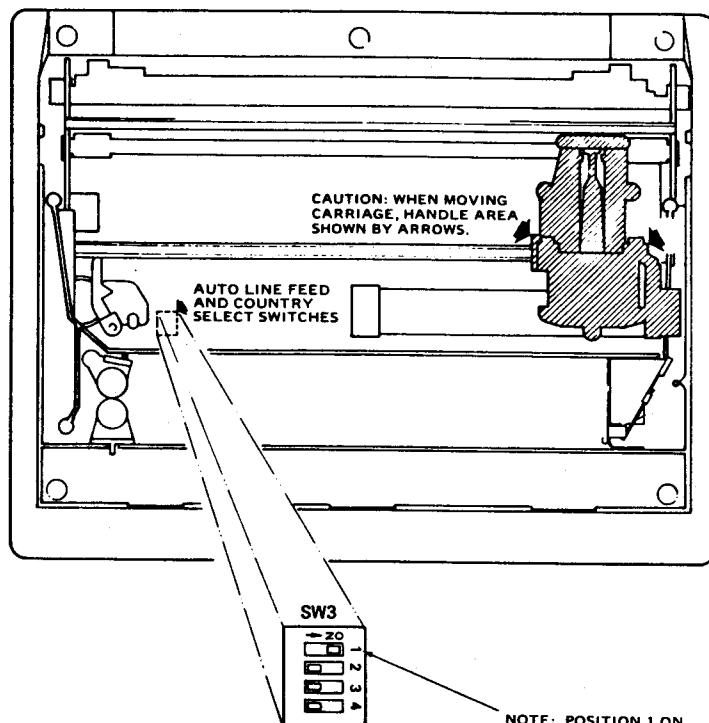
Figure 2-6. ASCII CODE CHART

2.3 AUTO LINE FEED ENABLE/DISABLE

The Automatic Line Feed (ALF) function is controlled by a DIP switch (Section 1 of SW3) on the logic P.C.B. (Refer to Figure 2-7). The printer is shipped from the factory with this switch in the ON position (Auto Line Feed Enabled). If the auto line feed is to be disabled, set the switch in the OFF position.

2.4 CHARACTER SET SELECTION

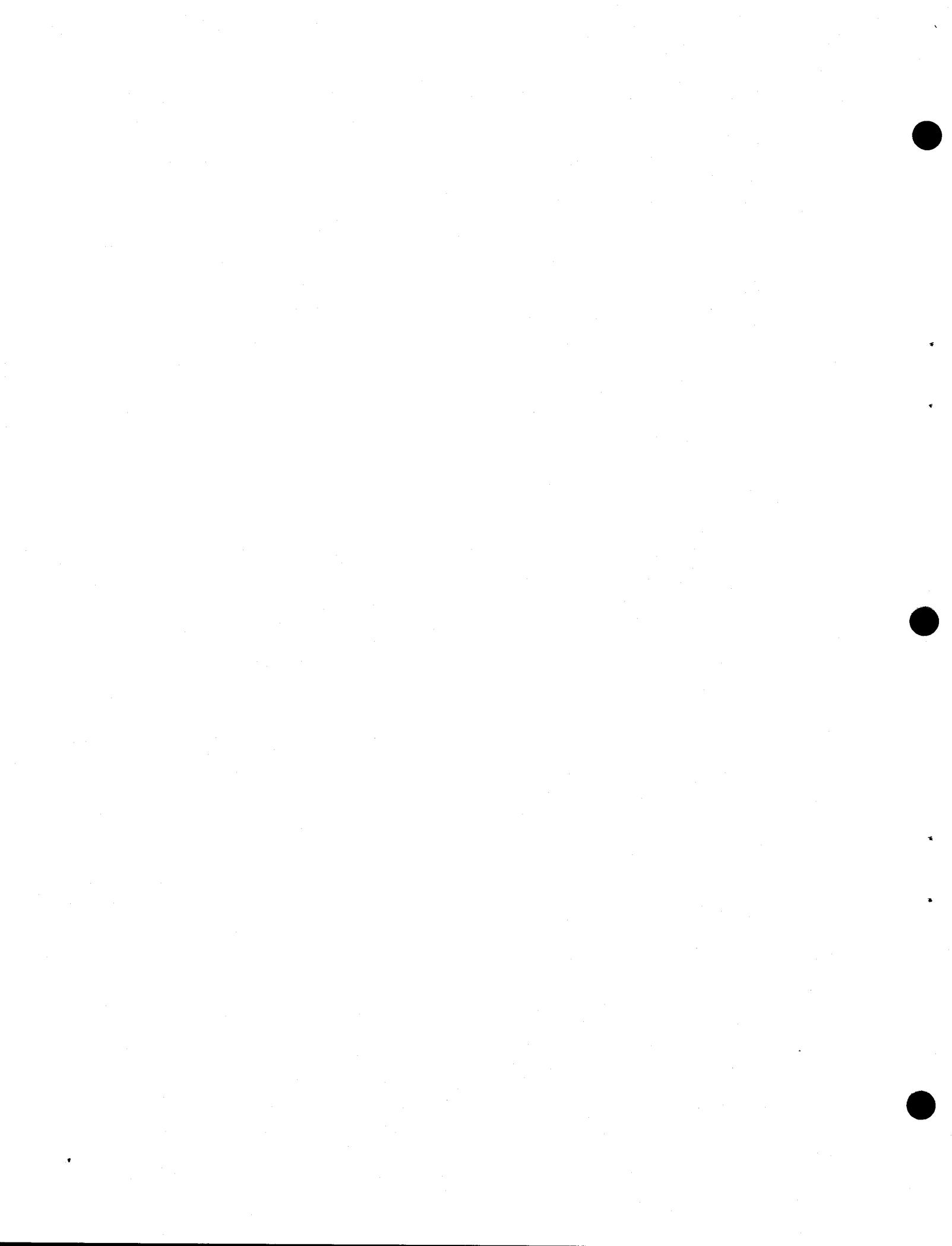
The unit can print character sets of six countries: U.S.A., France, United Kingdom, Germany, Italy and Sweden/Finland. The table in Figure 2-7 shows the settings of Sections 2, 3 and 4 of SW3 for the various character sets. To select the desired character set, place the POWER switch in the OFF position; remove the top cover and select the character set per Figure 2-7. Replace the top cover and restore power. NOTE: The unit is shipped from the factory configured for the U.S.A. character set.



CHARACTER SET	POS ON SW3		
	2	3	4
USA	ON	ON	ON
FRANCE	OFF	ON	ON
UK	ON	OFF	ON
GERMANY	OFF	OFF	ON
ITALY	ON	ON	OFF
SWED/FIN	OFF	ON	OFF

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Figure 2-7. SETTING AUTO LINE FEED AND CHARACTER SET SWITCHES



SECTION 3

THEORY OF OPERATION

3.1 BASIC DESCRIPTION

Figure 3-1 is a basic block diagram of the Line Printer II. All logic, control, drive, and power supply circuits are contained on one printed circuit board within the printer. The print head is mounted on a carriage assembly driven by a dc motor. Printing is performed in the forward direction only (left to right), printing up to seven dots per column. The paper drive roller is driven by a line feed solenoid which advances paper 1/6 inch each time the line feed solenoid is actuated. The ribbon drive motor moves ribbon past the print head at all times except when the carriage assembly actuates the sensor at the leftmost carriage position. The power supply provides +5V regulated, +5V EXT SENSE for host device sense, +12V regulated for motor drive, +17V for solenoid drive, and +24 VAC for the ribbon drive motor.

The host device transmits 8-bit parallel (ASCII) data signals and a data strobe signal to the printer logic. Control of the transfer of data is achieved using the busy, demand, and acknowledge signals generated by the printer logic.

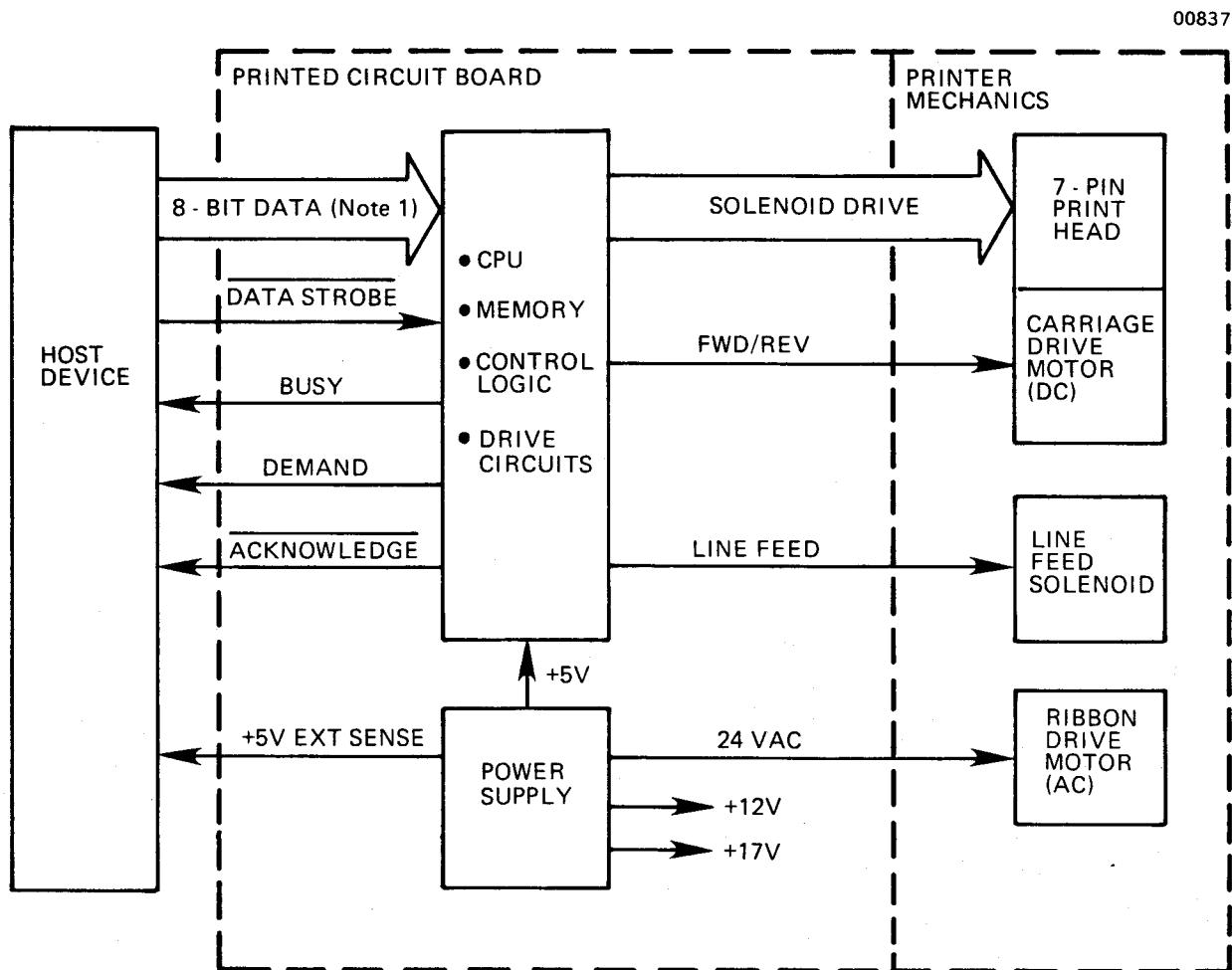


Figure 3-1. LINE PRINTER II BASIC BLOCK DIAGRAM

The printer accepts and stores input character data in an input buffer until either the buffer is filled or a carriage return (CR) control code is received. If the buffer is filled or a CR code is received, the content of the input buffer is printed. Printing of the characters is achieved by energizing solenoids in the print head which drive circular pins against the ribbon, paper, and platen as the print head is moved by the carriage drive motor forming the characters in a 7x7 dot-matrix pattern. Upon completion of printing the print head is moved to the left margin and the paper is advanced one line by energizing the line feed solenoid.

Line feed (LF) control codes received by the printer control paper movement. Each line feed code received causes the paper to be advanced one line. The printer has a special line feed buffer, separate from the input buffer, which can store up to 255 line feed commands. LF control codes are received at the same data transfer rate as character data (up to 9300 characters per second). The initial LF code causes an immediate advance of one line. Additional line feed codes received are stored as a count in the line feed buffer. Line feed codes and character data sent to the printer may be intermixed, however, all line feeds received are performed before printing the next line of data.

Automatic line feed upon completion of printing each line may be disabled by setting Section 1 of DIP switch 3 on the printer logic printer circuit board to the OFF position. If this function is disabled, the first line of data will be printed when a CR control code is received or a buffer full condition occurs. After printing the first line of data, the print head is returned to the left margin and the paper is not advanced. The second line (and subsequent lines) of data must have at least one LF control code preceed each CR control code or buffer full condition, or overprinting will occur.

Line feed codes may be used for limited paper handling functions. Each line feed code moves the paper one-sixth of an inch. Thus, for example, if it is desired to move the paper 12 inches, 72 line feed codes are required before a CR control code is sent.

On power-up or reset, the printer is preset to the 10 cpi character density. To select the condensed 16.7 cpi character density, an ESC, DC4 code sequence is sent to the printer. The input buffer is set a 80 characters, buffer full, for 10 cpi and 132 characters, buffer full, for 16.7 cpi. The ESC, DC4 code sequence sent within a line of data is ignored. The 16.7 cpi condensed print is deselected by sending an ESC, DC3 code sequence or at the end of a print line.

The two character densities, 10 and 16.7 cpi may be elongated anywhere in the line. Elongated characters are double width characters formed by printing each column of dots within each character twice. Spaces between characters are also twice as wide. This effectively halves the number of characters per inch (cpi). Figure 3-2 shows the normal and elongated character styles.

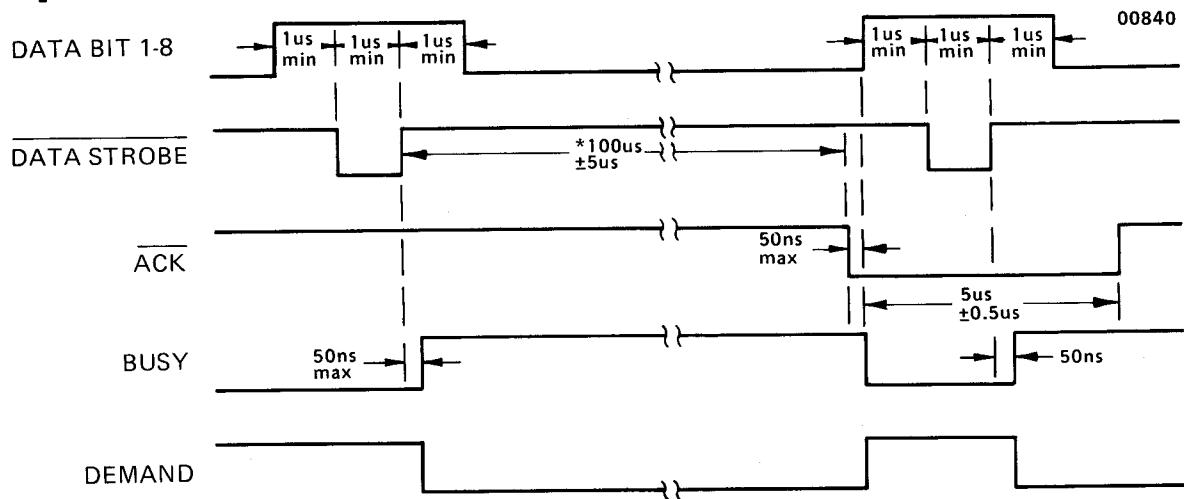
Elongated characters are initiated by using the escape code ESC, SO code sequence (or data bit 8 logically high) and terminated by the escape code ESC, SI code sequence (or data bit 8 logically low). Elongated characters are automatically terminated at the end of a line. Reception of an ESC SO code sequence causes all data following the code sequence to be printed elongated. Control code sequence ESC, SI causes all data following the code sequence to be printed normal size. Elongated characters may be initiated and terminated any number of times within a line. The end of a print line terminates printing of elongated characters, and unless elongated characters are initiated by the ESC, SO code sequence preceeding the data for the next line, the characters in the next line will be printed normal size.

NORMAL CHARACTERS (10 cpi)

ELONGATED CHARACTERS (10 cpi)

Figure 3-2. LINE PRINTER II CHARACTER STYLES

Figure 3-3 shows the printer interface timing. Each set of data bits (1-8) sent to the printer is strobed by the DATA STROBE signal sent to the printer by the host device. Within 50 nanoseconds following the trailing edge of the DATA STROBE signal a BUSY signal is generated by the printer which is sent to the host device. The BUSY signal informs the host device that the printer is processing the input data and that no additional data from the host device will be accepted by the printer. After completion of processing the input data an acknowledge (ACK) signal is sent to the host device indicating that the data sent by the host device has been accepted and processed. Within 50 nanoseconds following the leading edge of the ACK signal the BUSY signal is terminated indicating that the printer is again ready to accept additional input data. A DEMAND signal is also generated by the printer and is available to the host device. The DEMAND signal is the inverse of the BUSY signal and when present (positive) indicates that the printer is not busy and is ready to accept data.



* 100 usec is for data reception and line feeds that do not fill the line feed buffer. For line feeds that fill the buffer, the time is 110 msec +10%, -0%. For carriage return codes, the maximum time is 2.6 seconds. In approximately 10% of the data transfer cycles (strobe to ACK cycles) a microprocessor interrupt occurs which extends the busy time from a nominal 100 usec to approximately 200 usec.

Figure 3-3. INTERFACE TIMING

The time between the trailing edge of the DATA STROBE signal and the leading edge of the ACK signal (data transfer cycle time) varies with the functions to be performed by the printer. For normal data inputs and LF control codes which do not fill the line feed buffer, the duration is nominally 160 microseconds. For LF control codes which fill the line feed buffer, the maximum time is 110 milliseconds +10, -0%. The maximum time for carriage return codes is 2.6 seconds. In approximately 10% of the normal data transfer cycles a microprocessor interrupt occurs which extends the time from a nominal 100 microseconds to approximately 200 microseconds.

Figure 3-4 shows the acknowledge timing on power-up. When power is initially turned on, approximately 20 milliseconds is required for internal voltages (+5V) to stabilize. Within 30 milliseconds after power is turned on the BUSY signal is generated and the printer remains in the BUSY condition for the next 170 milliseconds. The BUSY signal is then terminated and the printer generates the first acknowledge pulse indicating that the printer is no longer BUSY, is on line, and is ready to accept data. Data should not be sent to the printer until the first ACK signal is sent to the host device.

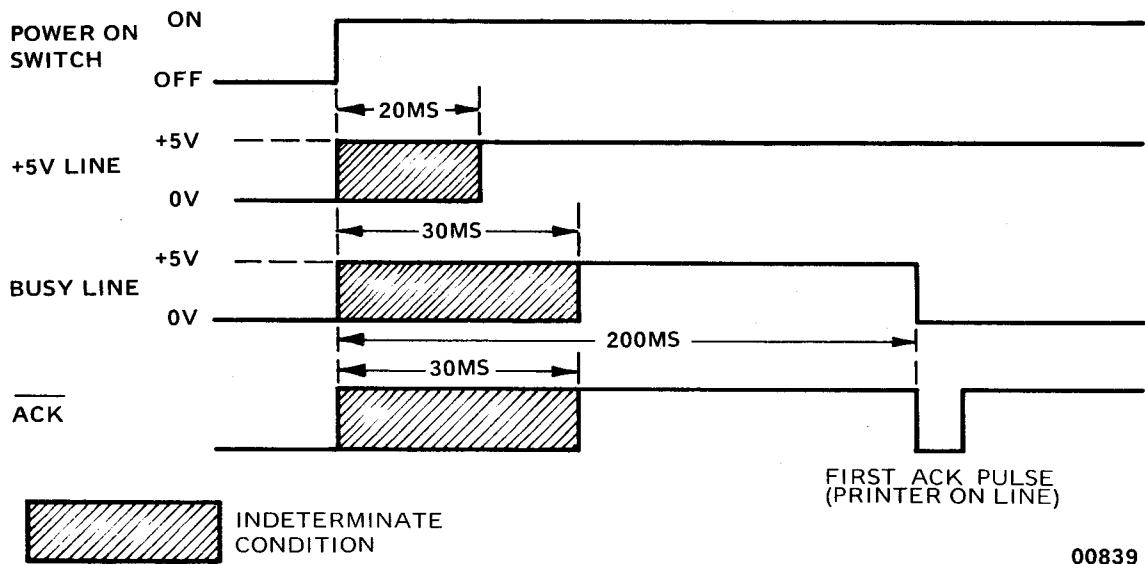
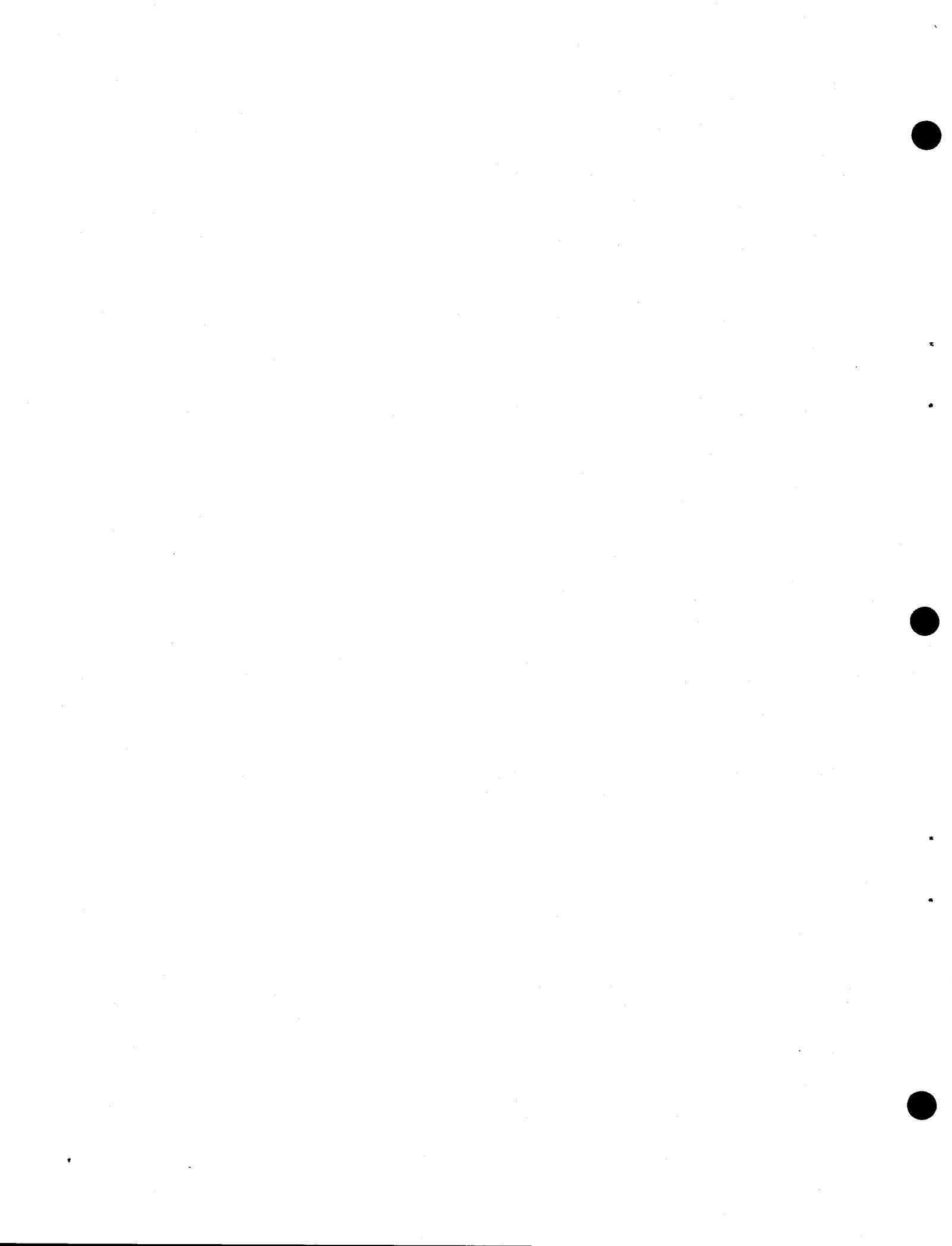


Figure 3-4. ACKNOWLEDGE TIMING ON POWER-UP

The POWER ON/OFF switch controls the application of primary power to the printer. When power is turned on, an LED visible through the paper exit slot indicates that the +5 volts is active. The ONLINE/OFFLINE switch controls the printer modes of operation. When placed in the ON position, the printer is placed in a local mode of operation, a BUSY signal is sent to the host device, the printer electronics are reset, and the input buffer is cleared. When placed in the OFF position, the printer electronics are reset, the print head is returned to the left margin, and the BUSY signal is discontinued allowing data to be sent by the host device. If the switch is placed in the ON position when the printer is processing a line of data, the printer will complete printing the line of data, return the print head to the left margin, then reset the printer electronics and clear the input buffer. If the printer is performing multiple line feeds at the time when the switch is placed in the ON position, the line feed operation currently being performed will be completed and the remaining line feeds will be processed when the printer is returned to the on-line mode. The ONLINE/OFFLINE switch should be placed in the OFFLINE position when turning power to the printer on or off as extraneous acknowledge (ACK) signals can occur during the periods when power is initially turned on or off.

CAUTION

Actuation of the ONLINE/OFFLINE switch results in loss of data contained in the input buffer.



SECTION 4

MAINTENANCE

4.1 GENERAL

This section contains information on maintaining and troubleshooting the printer. Routine preventive maintenance should be performed at regularly scheduled intervals to insure satisfactory performance of the printer. Preventive maintenance consists of periodic lubrication, cleaning, and adjustment of the printer. The recommended preventive maintenance schedule is contained in this section. Troubleshooting procedures are also contained in this section which will aid in isolating malfunctions to defective components or required adjustments.

4.2 PREVENTIVE MAINTENANCE

Table 4-1 contains the recommended preventive maintenance routines to be performed and indicates the recommended frequency of performance. Preventive maintenance may be required more or less frequently than indicated depending upon the printer application, operating environment, and type of paper or forms being used.

<u>Tools Required</u>	<u>Materials Required</u>
Lint-free Cloth Soft-bristle Brush	Light Lubricating Oil Mild Detergent Solution

WARNING

When performing preventive maintenance procedures, the POWER ON/OFF switch must be in the OFF position and the AC input plug must be disconnected. High voltages are present in some locations within the printer when the printer is turned OFF.

Table 4-1. Preventive Maintenance

<u>ITEM</u>	<u>FREQUENCY</u>	<u>PROCEDURE</u>
External Cleaning	As Required	Clean all external surfaces using a mild detergent and a soft, clean, lint-free cloth.
Internal Inspection	Each Ribbon Change	Visually inspect interior of printer for loose wires, connectors, and hardware, chafing of cables, and badly worn or damaged parts.
Print Head and Carriage Assembly	Each Ribbon Change	After removing ribbon, use a light-bristle brush to carefully remove dust and residue from print head and carriage assembly.
Print Head	Each Ribbon Change	Using a soft, clean, lint-free cloth, gently remove all dried ink from the front of the print head.
General Cleaning	6 Months	Perform all of the above procedures. Clean the platen surface using a mild detergent and water, and a soft, lint-free cloth. Using a vacuum cleaner with a soft brush attachment carefully vacuum interior of printer taking care not to damage printer.
Carriage Guide Bars	6 Months	Move print head to left side of printer. Apply several drops of lubricating oil to clean, lint-free cloth and lightly rub carriage guide bars to remove any build-up of residue. Move print head to right side of printer and repeat procedure.
Paper Drive Roller	6 Months	Using a lint-free cloth, clean the paper drive roller and plate bushings. After cleaning, apply one drop of light lubricating oil to both paper roller end plate bushings. Cycle the paper roller using the thumbwheels to allow the oil to seep into the bushings.

4.3 OPERATOR TROUBLESHOOTING

Table 4-2 lists some malfunctions which may occur, the probable causes, and the remedies which may be performed by the operator of the equipment. If the equipment remains inoperative after performing the remedies indicated, the equipment should be serviced by qualified service personnel. Note that the warranty is voided if attempts to repair the printer result in further damage.

WARNING

When performing operator troubleshooting procedures, the POWER ON/OFF switch must be in the OFF position and the AC input plug must be disconnected. High voltages are present in some locations within the printer when the printer is turned OFF.

Table 4-2. Operator Troubleshooting Chart

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>REMEDY</u>
Print too light.	Print head release lever open or partially open.	Rotate print head release lever clockwise to normal printing position.
	Worn or defective ribbon.	Replace ribbon.
Roll Paper/Cut-sheet paper does not advance properly.	Pinch roller release lever in open position.	Pull pinch roller release lever forward to closed position.
Ribbon does not feed properly.	Ribbon twisted or improperly loaded.	Check ribbon threading and correct as required.
	Ribbon drive rollers not engaged properly.	Open and release driven roller. Rotate driven roller clockwise to assure proper movement of ribbon.
Printer completely inoperative.	AC input plug not connected.	Connect AC input connector to power source.
	Paper jam.	Remove power and carefully clear paper jam. Check condition of ribbon before returning power.
	Fuse F1 blown.	Check if "Power On" LED is lit by looking down through paper exit slot. If not lit, replace fuse F1.

Table 4-2. Operator Troubleshooting Chart (cont'd)

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>REMEDY</u>
Power applied/data sent-printer does not print.	Cable between input device and printer not connected.	Check that connectors at both ends of data input cable are properly connected to mating connectors.
	ONLINE/OFFLINE switch in OFFLINE position.	Place switch in ONLINE position.

4.4 FUSE REPLACEMENT

4.4.1 REMOVAL OF COVERS

In order to replace fuse F1, and to troubleshoot and repair the printer, it is necessary to remove the covers. Refer to Figure 4-1 and proceed as follows:

1. Place POWER ON/OFF switch in OFF position and disconnect ac input plug from power source. Disconnect data input connector.
2. Remove top cover by lifting rear edge until latches are clear of body cover and then slide cover towards rear of printer to disengage front clips.
3. Unthread the ribbon from the print head carriage assembly, then take up slack in ribbon by turning ribbon drive roller knob clockwise.
4. Release the two Phillips-head screws at the front of the printer and the three Phillips-head screws at the rear of the printer.
5. Gradually raise the body cover until there is enough room to reach under the front of the cover.
6. Reach under the body cover and disconnect the ribbon drive motor cable connector from connector J002 on the logic PC board.
7. Keep the body cover level to prevent ribbon from unthreading and set cover to one side.
8. To reassemble printer, reverse procedure.

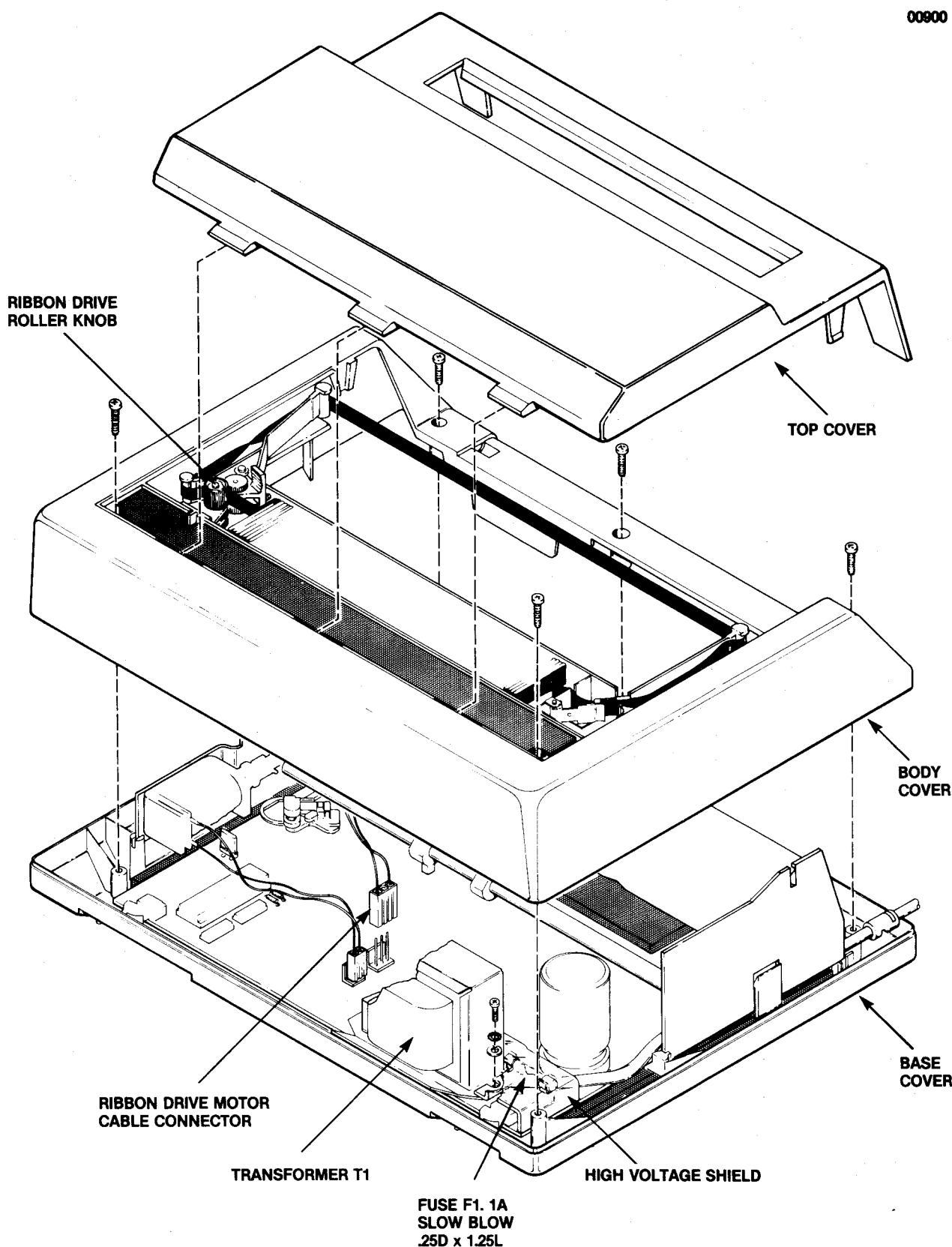


Figure 4-1. REPLACEMENT OF FUSE F1

4.4.2 FUSE REPLACEMENT

Fuse F1 is located on the forward right-hand corner of the logic pcb adjacent to the power transformer and POWER ON/OFF switch. Refer to Figure 4-1 and proceed as follows:

1. Remove covers to gain access to logic pcb mounted on the base cover. (See Paragraph 4.4.1.)
2. Loosen screw, located on right side of transformer using a Phillips screwdriver.
3. Remove the clear plastic high voltage shield covering the fuse and AC input circuits.
4. Remove and replace the defective fuse.
5. Reinstall the high voltage shield. Make sure that the slotted portion of the shield is under the flat washer.
6. Tighten the Phillips-head screw to secure the shield and transformer.
7. Replace the covers.

4.5 DETAILED TROUBLESHOOTING

Table 4-3 lists some malfunctions which may occur, the probable causes, and the remedies which may be performed by qualified service personnel. The procedures referenced in the detailed troubleshooting chart should only be performed by qualified service personnel who have been trained to maintain and repair complex electronic and electromechanical equipment.

Table 4-3. Detailed Troubleshooting Chart

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>REMEDY</u>
Head drags (wide smudge on paper).	Head gap improperly adjusted.	Adjust printer head gap. (See paragraph 5.3.)
	Defective head-carriage assembly.	Replace defective head-carriage assembly. (See paragraph 6.8.)
Light smudge under print line.	Head gap improperly adjusted.	Adjust printer head gap. (See paragraph 5.3.)
	Defective head-carriage assembly.	Replace head-carriage assembly. (See paragraph 6.8.)

Table 4-3. Detailed Troubleshooting Chart (cont'd)

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>REMEDY</u>
Tears or creases in paper (jams).	Head gap improperly adjusted.	Adjust printer head gap. (See paragraph 5.3.)
	Defective head-carriage assembly.	Replace head-carriage assembly. (See paragraph 6.8.)
Print too light.	Head gap improperly adjusted.	Adjust printer head gap. (See paragraph 5.3.)
	Worn out or defective ribbon.	Replace ribbon. (See Owners Manual.)
	Defective head-carriage assembly.	Replace head-carriage assembly. (See paragraph 6.8.)
Print contrast varies across print line.	Head gap improperly adjusted.	Adjust printer head gap. (See paragraph 5.3.)
	Platen assembly improperly adjusted.	Adjust platen assembly. (See paragraph 6.9.)
	Defective head-carriage assembly.	Replace head-carriage assembly. (See paragraph 6.8.)
Left hand margin wanders.	Defective mechanism assembly.	Replace mechanism assembly. (See paragraph 6.2.)
	Head gap improperly adjusted.	Adjust printer head gap. (See paragraph 5.3.)
	Defective printed circuit board.	Replace printed circuit board. (See paragraph 6.3.)
Prints too slow.	Defective mechanism assembly.	Replace mechanism assembly. (See paragraph 6.2.)
	Printer requires general cleaning and lubrication.	Clean and lubricate printer. (See paragraph 4.6.)
	Rotor/Hall effect device improperly adjusted.	Adjust rotor/Hall effect device. (See paragraph 5.5.)
Print density (speed) improperly adjusted.	Print density (speed) improperly adjusted.	Adjust print density (speed). (See paragraph 5.7.)

Table 4-3. Detailed Troubleshooting Chart (cont'd)

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>REMEDY</u>
Prints too slow. (cont'd)	Defective printed circuit board.	Replace printed circuit board. (See paragraph 6.3.)
	Defective head-carriage assembly.	Replace head-carriage assembly. (See paragraph 6.8.)
	Defective mechanism assembly.	Replace mechanism assembly. (See paragraph 6.2.)
Prints erratically (missing dots).	Defective 7-wire head ribbon cable assembly.	Replace 7-wire head ribbon cable assembly.
	Defective 8049 micro-processor.	Replace 8049 micro-processor.
	Defective printed circuit board.	Replace printed circuit board. (See paragraph 6.3.)
	Defective FF head.	Replace FF head, 7-wire flex circuit.
Pin No. 7 prints too light.	Defective head-carriage assembly.	Replace head-carriage assembly. (See paragraph 6.8.)
	Defective platen assembly.	Replace platen assembly. (See paragraph 6.9.)
Line feed operates improperly.	Printer requires general cleaning and lubrication.	Clean and lubricate printer. (See paragraph 4.6.)
	Line feed solenoid improperly adjusted.	Adjust line feed solenoid. (See paragraph 5.6.)
	Defective line feed solenoid assembly.	Replace line feed solenoid. (See paragraph 6.4.)
	Defective mechanism assembly.	Replace mechanism assembly. (See paragraph 6.2.)
	Defective printed circuit board.	Replace printed circuit board. (See paragraph 6.3.)

Table 4-3. Detailed Troubleshooting Chart (cont'd)

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>REMEDY</u>
Carriage emits thumping noise while printing.	Printer requires general cleaning and lubrication.	Clean and lubricate printer. (See paragraph 4.6.)
	Defective head-carriage assembly.	Replace head-carriage assembly. (See paragraph 6.8.)
	Defective carriage molded rack assembly.	Replace carriage molded rack assembly. (See paragraph 6.5.)
	Defective mechanism assembly.	Replace mechanism assembly. (See paragraph 6.2.)
Excessive print density at beginning of print line (overprint).	Defective printed circuit board.	Replace printed circuit board. (See paragraph 6.3.)
No ribbon movement.	Defective ribbon drive motor.	Replace ribbon drive motor.
	Defective printed circuit board.	Replace printed circuit board. (See paragraph 6.3.)

4.6 GENERAL CLEANING AND LUBRICATION

The general cleaning and lubrication procedure should be performed by qualified service personnel whenever the printer requires servicing or repairs which require the cover assemblies to be disassembled. The procedures should be performed prior to performing detailed service and repair procedures as some malfunctions can be caused by dust, ribbon chaff, paper chaff, residue build-up, or inadequate lubrication.

- A. Remove the printer covers.** (Refer to paragraph 4.4.1.)
- B. Visually inspect the interior of printer for loose wires, connectors, and hardware, chaffing of cables, and badly worn or damaged parts.**
- C. Remove the Mechanism Assembly** (refer to paragraph 6.2) and set it to one side.
- D. Using a light bristle brush sweep away the paper and dust residue from the printer base and printed circuit board.**
- E. Clean the print head and carriage assembly using a light bristle brush to remove dust and residue.**
- F. Gently remove all dried ink from the front of the print head using a soft, clean, lint-free cloth.**
- G. Clean contaminated parts of the rest of the mechanism assembly using a freon-moistened lint-free cloth. Pay particular attention to the carriage shafts and the paper roller end-plate bushings.**
- H. Clean the carriage guide bars by applying several drops of lubricating oil to a soft, clean lint-free cloth, then moving the print head to the left side of printer and lightly rubbing the guide bars to remove residue build-up. Move print head to the right side of the printer and clean the left side of the guide bars.**
- I. Clean the paper drive roller and the end plate bushings using a soft, clean, lint-free cloth. Then apply one drop of light lubricating oil to both paper roller end plate bushings. Cycle the paper roller using the thumbwheels to aid the oil to seep into the bushings.**
- J. Reassemble the printer and continue with service procedures.**
After completion of service, clean all external surfaces using a mild detergent and a soft, clean, lint-free cloth.

SECTION 5

ADJUSTMENTS

5.1 INTRODUCTION

The printer must be adjusted to correct certain malfunctions or to correct marginal operation. Adjustment procedures should also be performed whenever an affected part is replaced in the printer. The following adjustment procedures are contained in this section.

- o Printer Head Gap Adjustment
- o Platen Adjustment
- o Line Feed Solenoid Adjustment
- o Rotor/Hall Effect Sensor Clearance Adjustment
- o Print Density (Speed) Adjustment

All of the procedures contained in this section are performed with the printer covers removed. Refer to paragraph 4.4.1 for the proper procedure.

Only the Print Density (Speed) adjustment is performed with power applied to the printer. As this procedure is performed with the covers removed, care must be taken to avoid personal contact with moving parts of the printer or to areas of the printer circuitry where dangerous voltages are present.

WARNING

Care must be taken when adjusting the printer with the covers removed and power applied to the printer as injury can result from contact with moving parts of the printer or areas within the printer where dangerous voltages are present.

Before performing any of the adjustment procedures contained in this section, the entire procedure should be read carefully to assure that the procedure is understood, that the appropriate tools and accessories are available, and that the appropriate care is exercised when performing the adjustment.

5.2 TOOLS AND ACCESSORIES

The procedures contained in this section require the following tools and accessories:

Tools

- 1/4-inch common screwdriver
- 1/4-inch nutdriver
- 5/8-inch nutdriver

Tools (cont'd)

No. 1 Phillips screwdriver
0.004-inch feeler gauge
0.005-inch feeler gauge
0.014-inch feeler gauge
2-mm hex key

Accessories

Linefeed adjustment gauge
3/8-inch ignition wrench with overall length less than 2 inches
Mini-Exerciser
Mini-Exerciser interface cable

The accessories listed above may be procured from Centronics.

5.3 PRINthead GAP ADJUSTMENT

- A. Remove the printer covers. (Refer to paragraph 4.4.1.)
- B. Move the printhead to the center of the printer mechanism.
- C. Place the printhead release lever in position 3 and insert a 0.014-inch feeler gauge between the nose of the printhead and the platen.
- D. Loosen the setscrew on the left side of the head carriage assembly using a 2-mm hex key.
- E. Adjust the cam-bushing adjusting nut located under the left side of the head-carriage assembly until the 0.014-inch feeler gauge slips easily between the printhead nose and the platen.

NOTE

Ensure that the printhead release lever is maintained in position 3 during this adjustment.

- F. Tighten the setscrew loosened in step C. using a 2-mm hex key.

5.4 PLATEN ADJUSTMENT

- A. Remove the printer covers. (Refer to paragraph 4.4.1.)
- B. Perform the printhead gap adjustment procedure. (See paragraph 5.3.)
- C. Move the printhead to the left side of the printer.

5.4 PLATEN ADJUSTMENT (cont'd)

- D. Place the printhead release lever in position 3. Then, insert a 0.014-inch feeler gauge between the nose of the printhead and the platen.
- E. Adjust left hand platen screw until the feeler gauge fits loosely between the printhead and the platen.
- F. Move the printhead to the right side of the printer.
- G. Place the printhead release lever in position 3 and insert a 0.014-inch feeler gauge between the nose of the printhead and the platen.
- H. Adjust the right hand platen screw until the feeler gauge fits loosely between the printhead and the platen.
- I. Apply red GLPT insulating varnish to the left and right hand platen screws.

5.5 ROTOR/HALL EFFECT SENSOR CLEARANCE ADJUSTMENT

- A. Remove printer covers. (Refer to paragraph 4.4.1.)
- B. Loosen the Hall effect sensor mounting screw on the head carriage assembly.
- C. Insert a 0.005-inch feeler gauge between the sensor and the magnetic rotor.
- D. Move the sensor against the feeler gauge until the gauge can be moved with slight friction, then tighten the mounting screw.
- E. Insert a 0.004-inch feeler gauge between the sensor and the magnetic rotor. The gauge should fit loosely.
- F. Move the head carriage assembly and observe the rotor. The rotor should revolve without touching the sensor.

5.6 LINE FEED SOLENOID ADJUSTMENT

- A. Remove printer covers. (Refer to paragraph 4.4.1.)
- B. Loosen the two solenoid mounting bolts located on the outside of the left printer mechanism side plate using a 5/16-inch nutdriver.
- C. Fully retract the solenoid plunger (move towards front) and insert the thick end (0.216 inch) of the solenoid adjustment gauge between the solenoid housing and the rubber O-ring.
- D. Adjust the solenoid lock nut using a 1/4-inch nutdriver so that some resistance is felt when the gauge is pulled out.

5.6 LINE FEED SOLENOID ADJUSTMENT (cont'd)

- E. Insert the thin end (0.136 inch) of the solenoid adjustment gauge between the solenoid housing and the rubber O-ring.
- F. Move the solenoid housing towards the rear of the printer mechanism, then move the housing forward until the pawl just engages the ratchet (without rotating the paper drive roller).
- G. Hold the solenoid housing in this position, tighten the two solenoid mounting bolts, and then remove the solenoid adjustment gauge.

5.7 PRINT DENSITY (SPEED) ADJUSTMENT

- A. Remove printer covers. (Refer to paragraph 4.4.1.)
- B. Set up printer for testing with Mini-Exerciser.
 1. Connect Mini-Exerciser using ribbon interface cable.
 2. Place right-hand (outer) switch on Mini-Exerciser in down position (print spaces).
 3. Place POWER ON/OFF switch in OFF position.
 4. Place ONLINE/OFFLINE switch in OFFLINE position.
 5. Connect power cord to a 3-wire grounded 120 Vac, 60 Hz outlet.
- C. Place POWER ON/OFF switch in ON position and observe that power on LED illuminates.
- D. Place ONLINE/OFFLINE switch in ONLINE position. The print head will move to the left margin, then move from the left margin to the right margin and back. Each time the print head reaches the right margin and reverses direction a line feed is executed. This action will continue until the printer is turned off or the ONLINE/OFFLINE switch is placed in the OFFLINE position.
- E. Determine the number of times the print head moves from left to right in one minute (lines per minute) by observing print head movement and using a watch or clock. The proper rate is from 29 to 32 lines per minute.
- F. Adjust resistor R25 until the proper rate (29 to 32 lines per minute) is achieved.

SECTION 6

REMOVAL AND REPLACEMENT

6.1 SCOPE OF THIS SECTION

This section contains removal and replacement procedures which should be performed by trained service personnel. Some procedures require special tools and adjustments. Replacement of the covers and line fuse F1 is contained in Section 4.

WARNING

Place power switch in the OFF position and remove plug from the wall outlet before performing any procedures in this section.

6.2 MECHANISM ASSEMBLY (See Figure 6-1)

When replacing the mechanism assembly, be certain to observe the caution before step e.

- a. See power removal WARNING (paragraph 6.1). Remove the top cover and body cover as detailed in paragraph 4.4.1.
- b. Carefully unplug the ribbon connector from J001 at the middle of the printed circuit board and unplug the line feed solenoid connector from J003.
- c. Release the mechanism assembly from the printer base by pulling out slightly on the retaining tabs at both sides. Lift the mechanism assembly up and out.
- d. Carefully unplug the ribbon cable from the connector on the carriage and save the cable for the replacement mechanism.

CAUTION

Before installing replacement mechanism assembly, check/adjust the following clearances: print head to platen, Hall effect sensor to magnetic rotor, and line feed solenoid clearances as detailed in Section 5. IMPORTANT - Move the carriage to the right side before installing the replacement mechanism assembly; otherwise, the RTP actuator arm may erroneously be positioned to the left side of the RTP assembly, which would result in damage to the carriage rack.

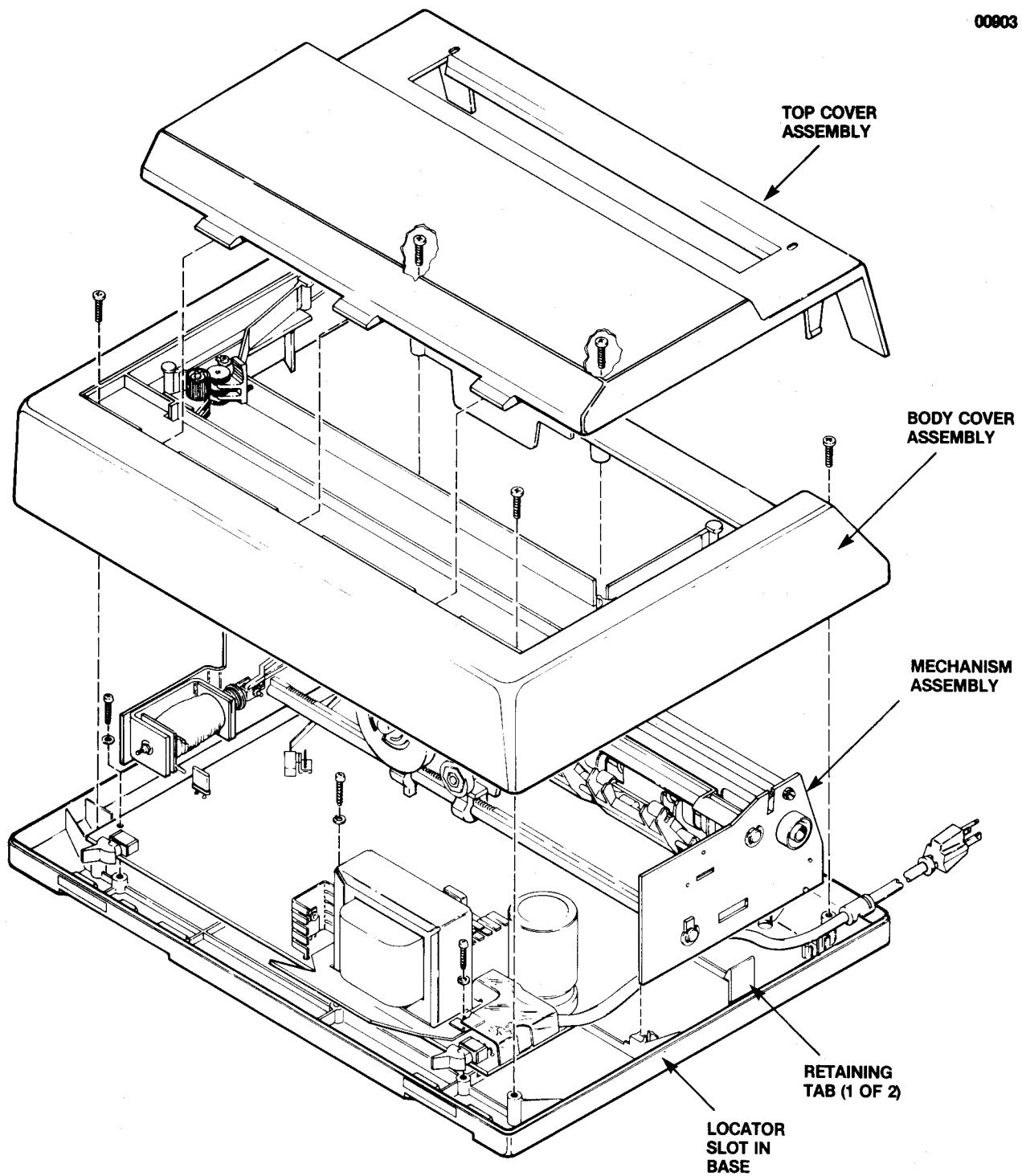


Figure 6-1. MECHANISM ASSEMBLY REPLACEMENT

- e. Install the replacement mechanism assembly by carefully indexing the side plates into the locator slots in the base, then lock the retaining tabs into the slots on the side plates.
- f. Install the ribbon cable, plugging it carefully into the sockets on the carriage and the printed circuit board. The ribbon cable must loop behind the strain-relief bar on the carriage assembly.
- g. Plug the solenoid connector into J003 and reassemble the body cover and top cover as detailed in paragraph 4.4.1.

6.3 PCB LOGIC BOARD (See Figure 6-2)

When replacing the logic pcb, removal of the assemblies is required as follows:

- a. See power removal WARNING (paragraph 6-1). Remove the cover assemblies as detailed in paragraph 4.4.1.
- b. Remove the mechanism assembly per paragraph 6.2.
- c. Remove one Phillips-head screw at the left front corner of the PCB and two Phillips-head screws at transformer T1. Save the transformer heat shield and plastic high voltage (fuse) shield for replacement.

CAUTION

When removing the pcb from the base, or when inserting the replacement pcb, take care not to damage the switches, which extend out of the front panel.

- d. Disengage the rear edge of the pcb by sliding it toward the front. Lift up at the rear edge and carefully pull the pcb out of the base, disengaging the line cord strain relief from the base.
- e. Install the replacement pcb, making certain that the shields from step c. are properly installed, and that the line cord strain relief is indexed properly at the rear of the base. Refer to steps d., c., b., and a. as required for reassembly.

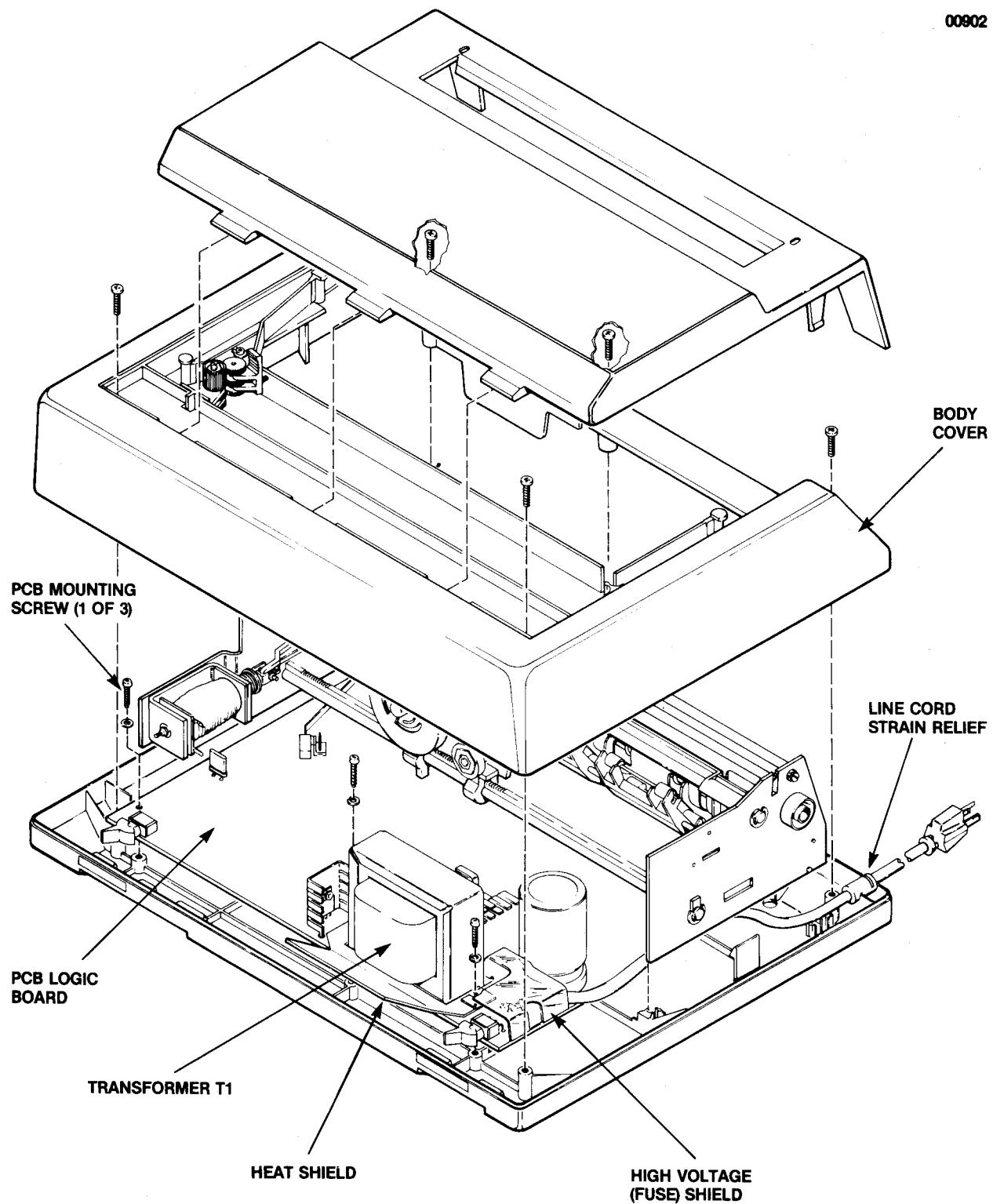


Figure 6-2. LOGIC BOARD REPLACEMENT

6.4 LINE FEED SOLENOID ASSEMBLY (See Figure 6-3)

To replace the line feed solenoid assembly, removal of the assemblies is required as follows:

- a. See power removal WARNING (paragraph 6.1). Remove the cover assemblies as detailed in paragraph 4.4.1.
- b. Remove the mechanism assembly per paragraph 6.2.
- c. Remove two solenoid mounting screws from the left side plate.
- d. Remove the solenoid assembly and plastic pawl arm by lifting up on the solenoid to disengage the pawl from the line feed roller ratchet.
- e. If required, remove the pawl arm from the solenoid clevis by removing the small retaining ring and pulling the clevis pin out. Save the pawl arm and hardware for the replacement solenoid assembly.
- f. Before installing the replacement solenoid assembly, check the clearance from the bottom of the solenoid bracket to the rubber O-ring as detailed in Section 5.
- g. Install the pawl arm on the replacement solenoid and mount the solenoid assembly on the left side plate, passing the pawl arm through the nylon guide and engaging the pawl into the ratchet on the roller.
- h. Check the solenoid throw tolerance as detailed in Section 5, and change the solenoid position as required for reliable line feed actuation.
- i. Install the mechanism assembly and cover assemblies. Refer to steps b. and a. as required.

6.5 CARRIAGE RACK, MOLDED (See Figure 6-4)

To replace the carriage rack, removal of the assemblies and lower carriage shaft is required as follows:

- a. See the power removal WARNING (paragraph 6.1). Remove the cover assemblies as detailed in paragraph 4.4.1.
- b. Remove the mechanism assembly per paragraph 6.2.
- c. On the left side plate, remove the rack tension leaf spring mounting screw with a 1/4-inch nutdriver. Remove the retaining ring from the end of the lower carriage shaft and the retaining ring inside the left side plate.

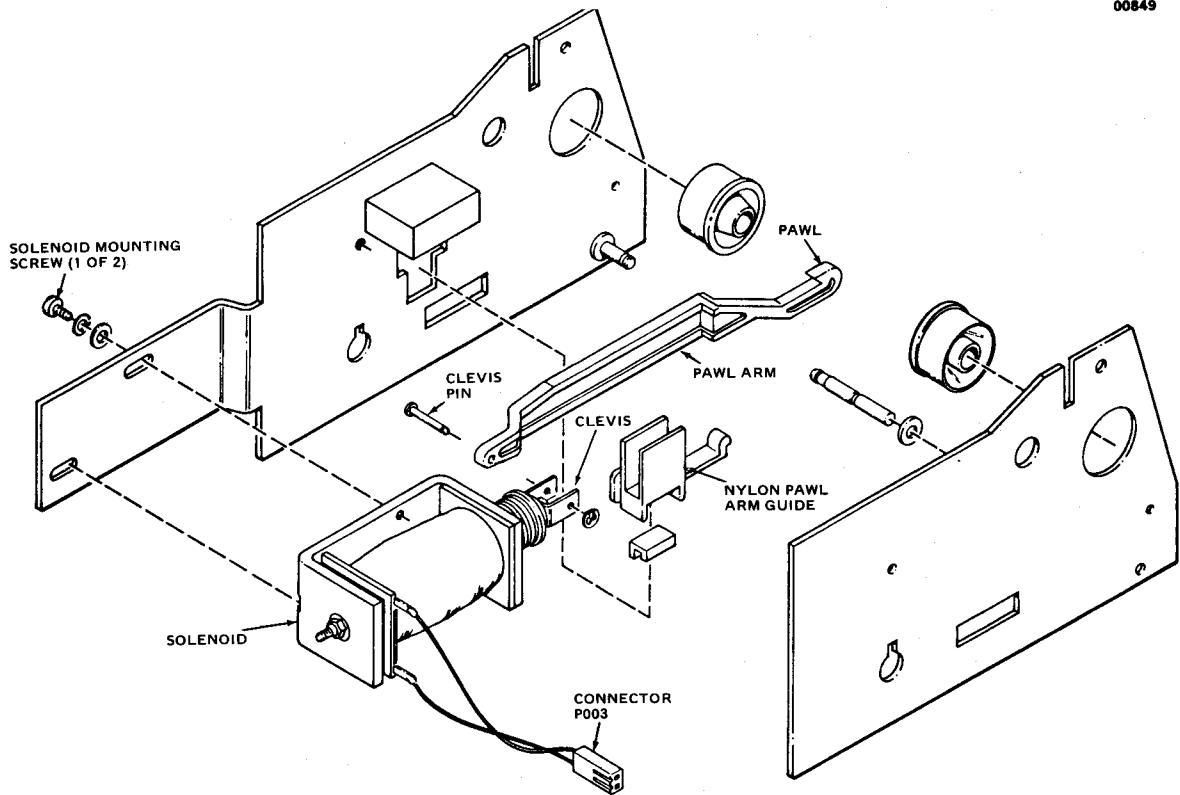


Figure 6-3. LINE FEED SOLENOID REPLACEMENT

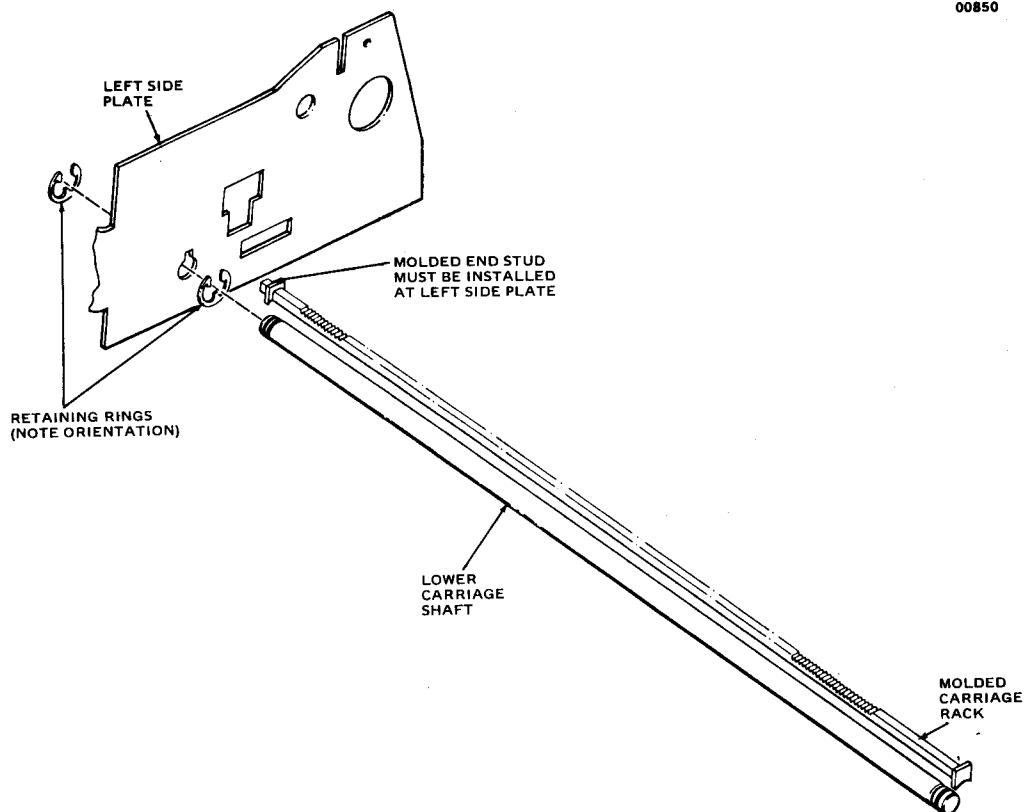


Figure 6-4. CARRIAGE RACK REPLACEMENT

- d. On the right side plate, remove only the inside retaining ring from the lower carriage shaft.
- e. Carefully slide the carriage shaft out of the right end plate. With the carriage shaft removed, the molded rack may now be removed.

CAUTION

The rack is not symmetrical, and must be installed so that the teeth are provided at the left end for the RTP function. The end with more teeth is also identified by a molded stud on the end.

- f. Insert the replacement rack, observing the CAUTION above. Insert the carriage shaft and orient the retaining ring on the right end so that it does not interfere with the end of the rack. Insert all retaining rings in this manner.
- g. Insert the rack tension leaf spring so that it tightens the rack.
- h. Install the mechanism assembly and cover assemblies, referring to steps b. and a. as required.

6.6 BASE COVER ASSEMBLY (See Figure 6-5)

To replace the base cover, remove the assemblies as follows:

- a. See the power removal WARNING (paragraph 6.1). Remove the cover assemblies per paragraph 4.4.1.
- b. Remove the mechanism assembly per paragraph 6.2.
- c. Remove the logic pcb per paragraph 6.3.
- d. Remove the base cover cap from the old base and insert it into the front panel hole at the same location on the replacement base cover assembly.
- e. Reinstall all assemblies on the replacement base cover. Refer to steps c., b. and a. as required.

6.7 BODY COVER ASSEMBLY (See Figure 6-5)

To replace the body cover assembly, proceed as follows:

- a. See the power removal WARNING (paragraph 6.1). Remove the cover assemblies per paragraph 4.4.1.
- b. Install the replacement body cover assembly consisting of the body cover, soundproofing, ribbon drive motor assembly, capstan and ribbon tensioner.
- c. Install a new ribbon.

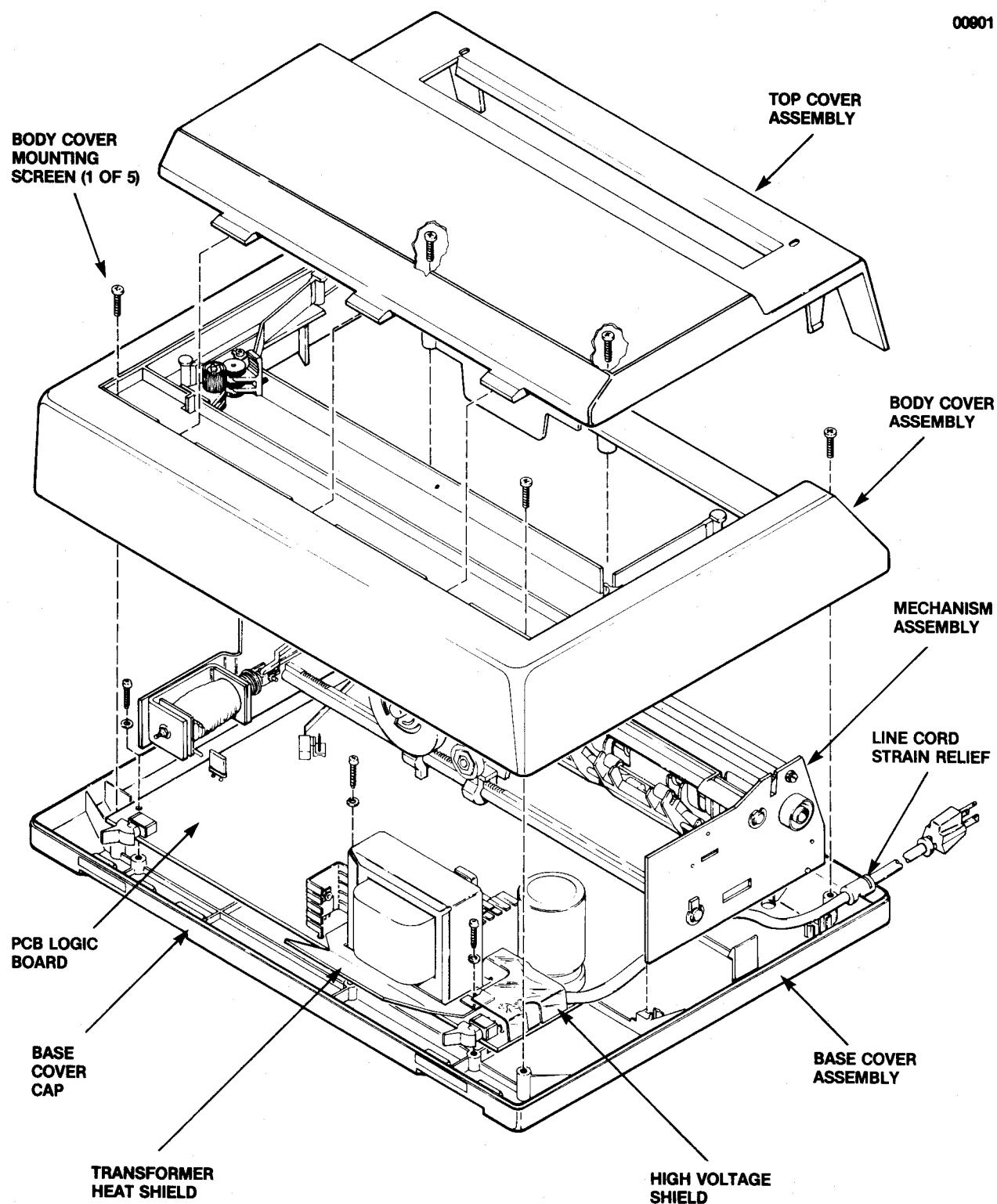


Figure 6-5. BASE AND BODY COVER ASSEMBLY REPLACEMENT

6.8 HEAD-CARRIAGE ASSEMBLY (See Figure 6-6)

Replacement of the head-carriage assembly requires removal of the assemblies as follows:

- a. See power removal WARNING (paragraph 6.1). Remove the cover assemblies per paragraph 4.4.1.
- b. Remove the mechanism assembly per paragraph 6.2.

CAUTION

When removing the carriage shafts, take care not to score the shafts, as this could result in rough carriage movement or excessive wear of the carriage. Also, the carriage must be supported and handled carefully during removal and replacement.

- c. Remove the two outside retaining rings from the carriage shafts at the right side plate. Then, remove the four inside retaining rings from the carriage shafts.
- d. Remove the rack tension leaf spring from the left side plate using a 1/4-inch nutdriver.
- e. Carefully press the right ends of the carriage shafts through the side plate, and move them out through the left side plate.
- f. Remove the molded rack from the mechanism assembly and set the defective head-carriage assembly aside.
- g. Align the replacement head-carriage assembly and insert the nylon rack through the carriage bushings, then index the ends of the rack into the slots in the side plates. See CAUTION below.

CAUTION

The rack is not symmetrical, and must be installed so that the end with the molded stud is at the left side plate. The additional rack teeth are required for the RTP function.

- h. Install the carriage shafts and rack tensioner leaf spring, referring to steps e., d., and c. as required. See NOTE below.

NOTE

Before installing the mechanism assembly on the base, perform the clearance check/adjustment on the head-carriage assembly for the printhead to platen gap and the Hall effect sensor (Column Sense) and rotating magnet gap.

- i. Install the mechanism assembly and cover assemblies, referring to steps b. and a. as required.

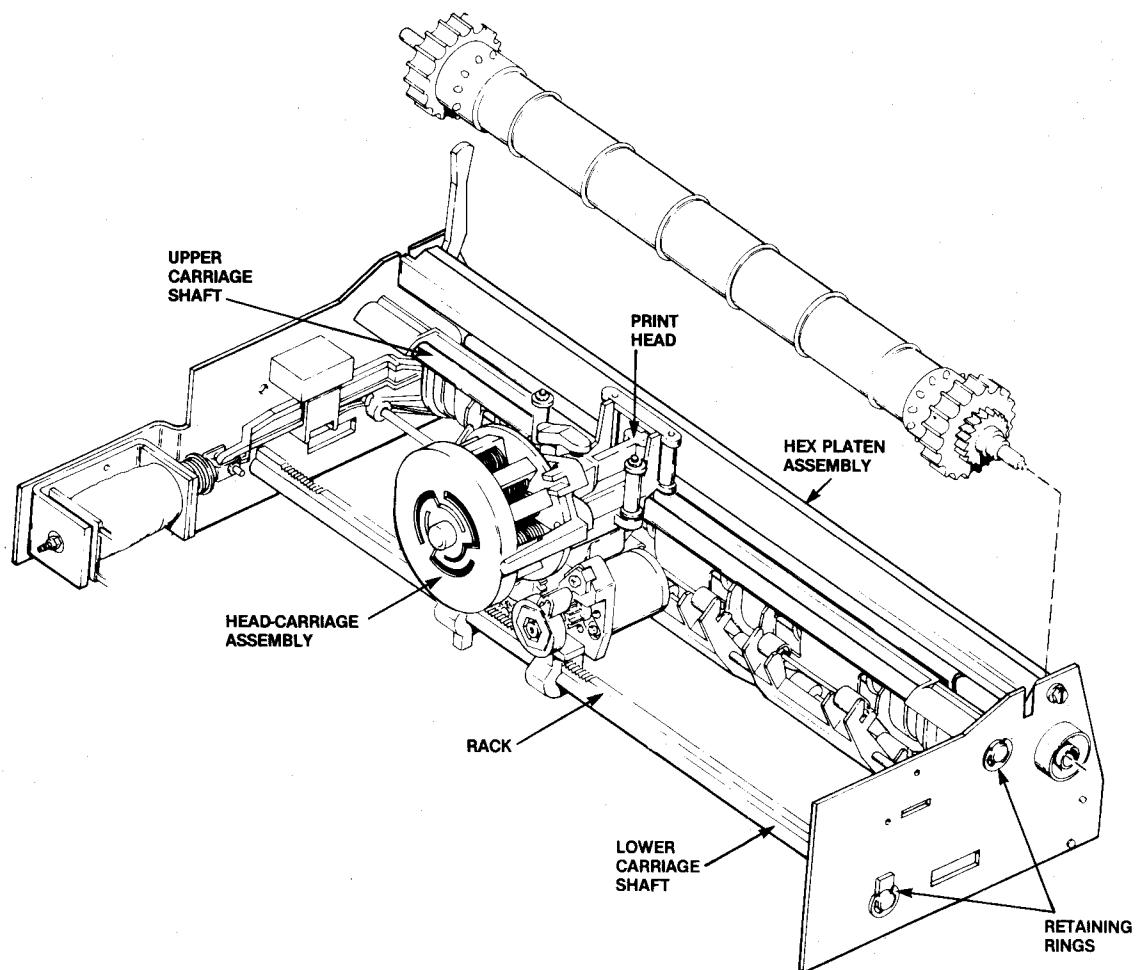


Figure 6-6. HEAD-CARRIAGE ASSEMBLY REPLACEMENT

6.9 PLATEN ASSEMBLY (See Figure 6-7)

Replacement of the head-carriage assembly requires removal of the assemblies as follows:

- a. See power removal WARNING (paragraph 6-1). Remove the cover assemblies per paragraph 4.4.1.
- b. Remove the mechanism assembly per paragraph 6.2.
- c. Remove one mounting screw from the side plate at each end of the platen using a 1/4-inch nutdriver.
- d. Remove the defective platen assembly by lifting upward at each end.
- e. Install the prealigned replacement platen assembly by inserting it firmly into the index slot at each side plate. Insert and tighten the mounting screws.
- f. Check the printhead to platen gap and adjust if required per Section 5.

g. Install the mechanism assembly and cover assemblies, referring to steps b. and a. as required.

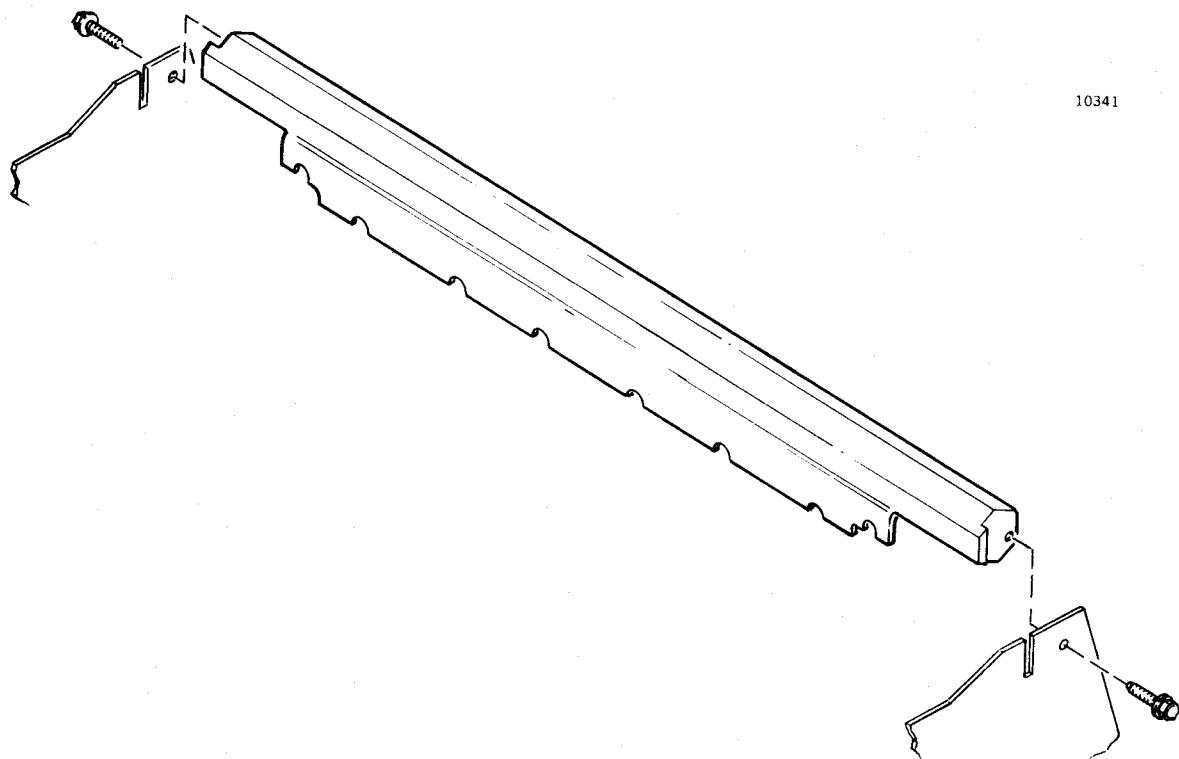
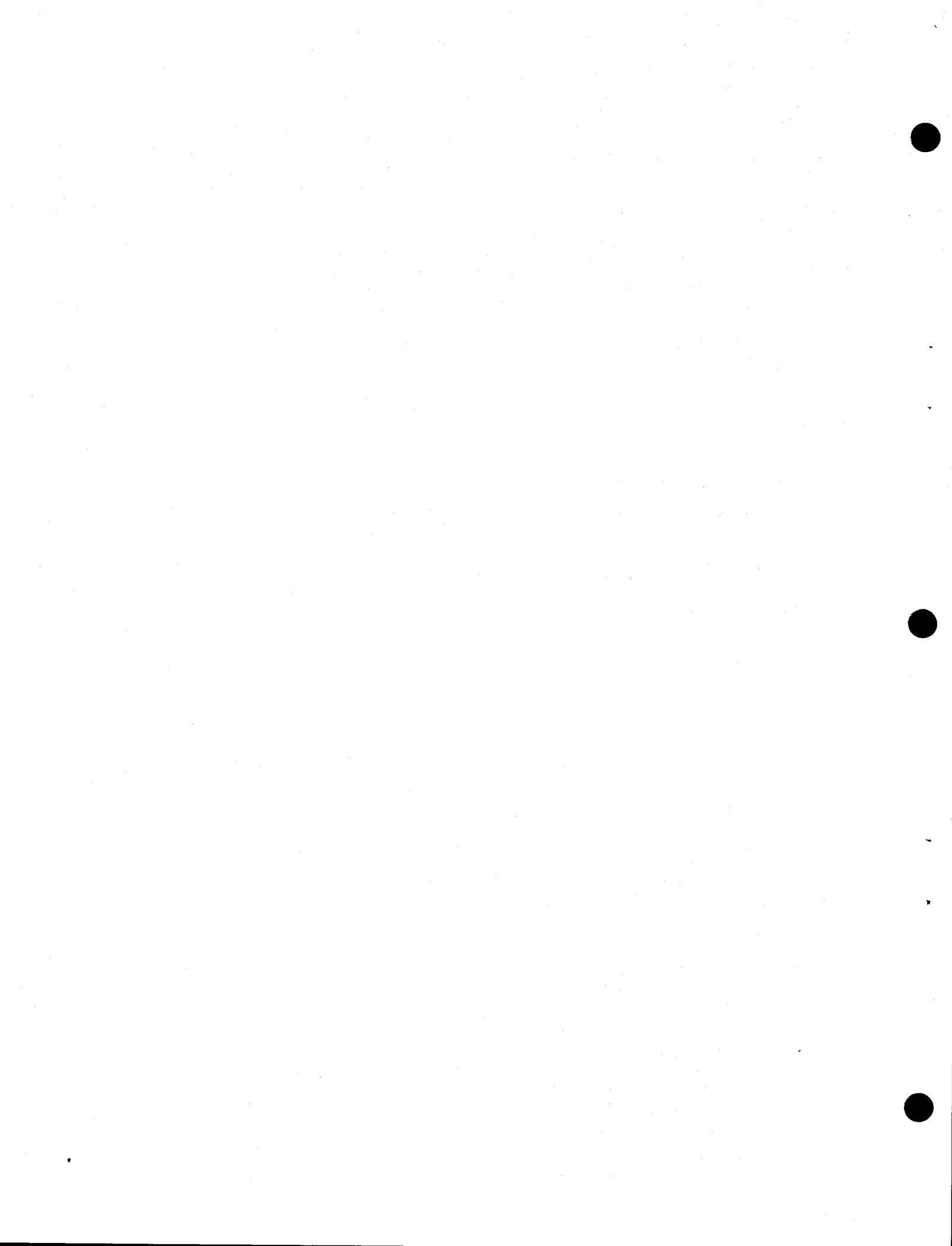


Figure 6-7. PLATEN ASSEMBLY REPLACEMENT



SECTION 7

SUPPORTING ILLUSTRATIONS

This section contains schematic diagrams of the two printed circuit boards in the Line Printer II. The schematics of the two boards are as follows:

<u>Figure</u>	<u>Title</u>	<u>Drawing No.</u>
7-1	Schematic Diagram, P.C.B. Logic Bd.	63669422-9001
7-2	Schematic Diagram, P.C.B. Flyback Protect Bd.	63669416-9001

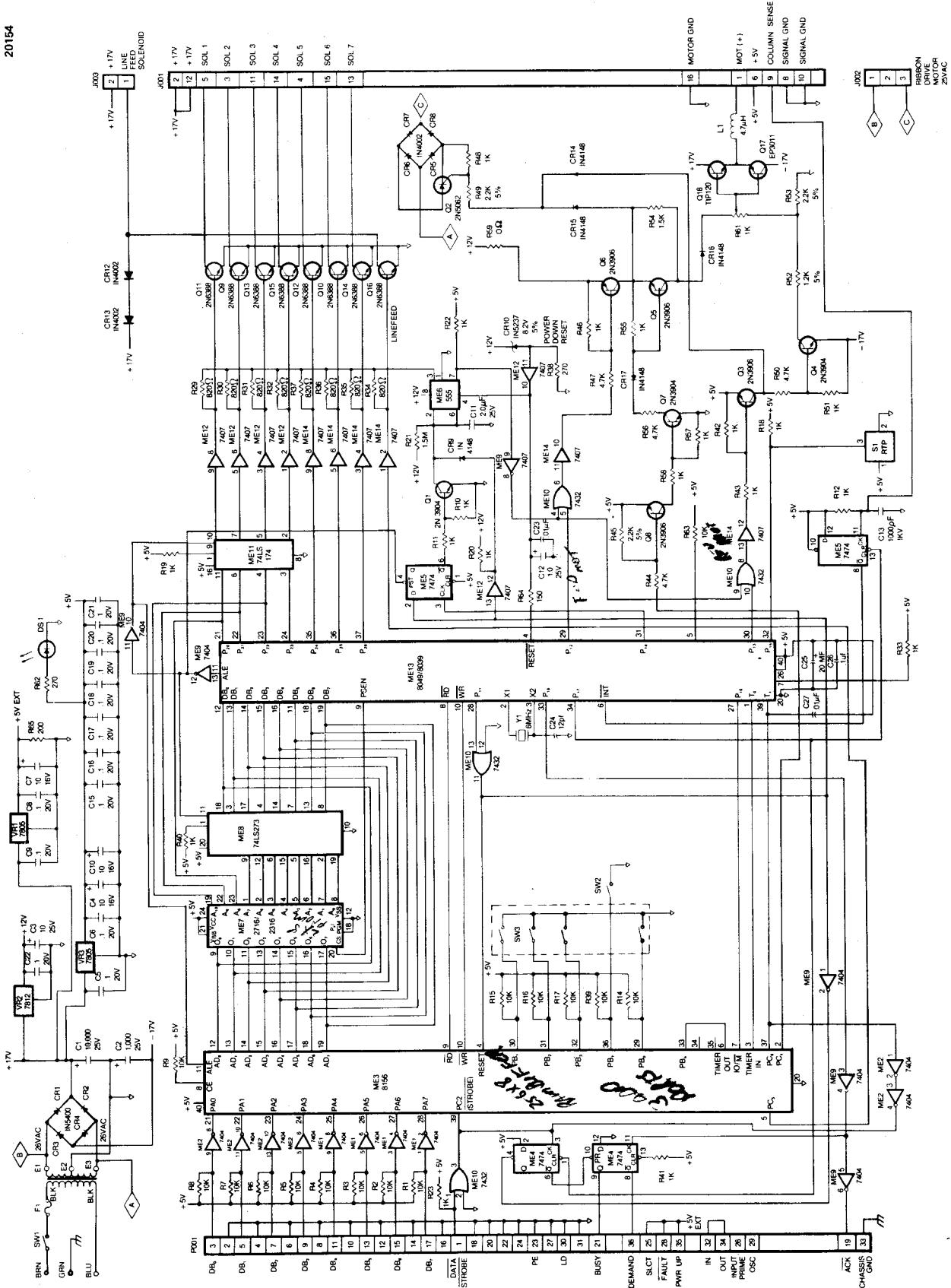


Figure 7-1. SCHEMATIC DIAGRAM, P.C.B. LOGIC BOARD

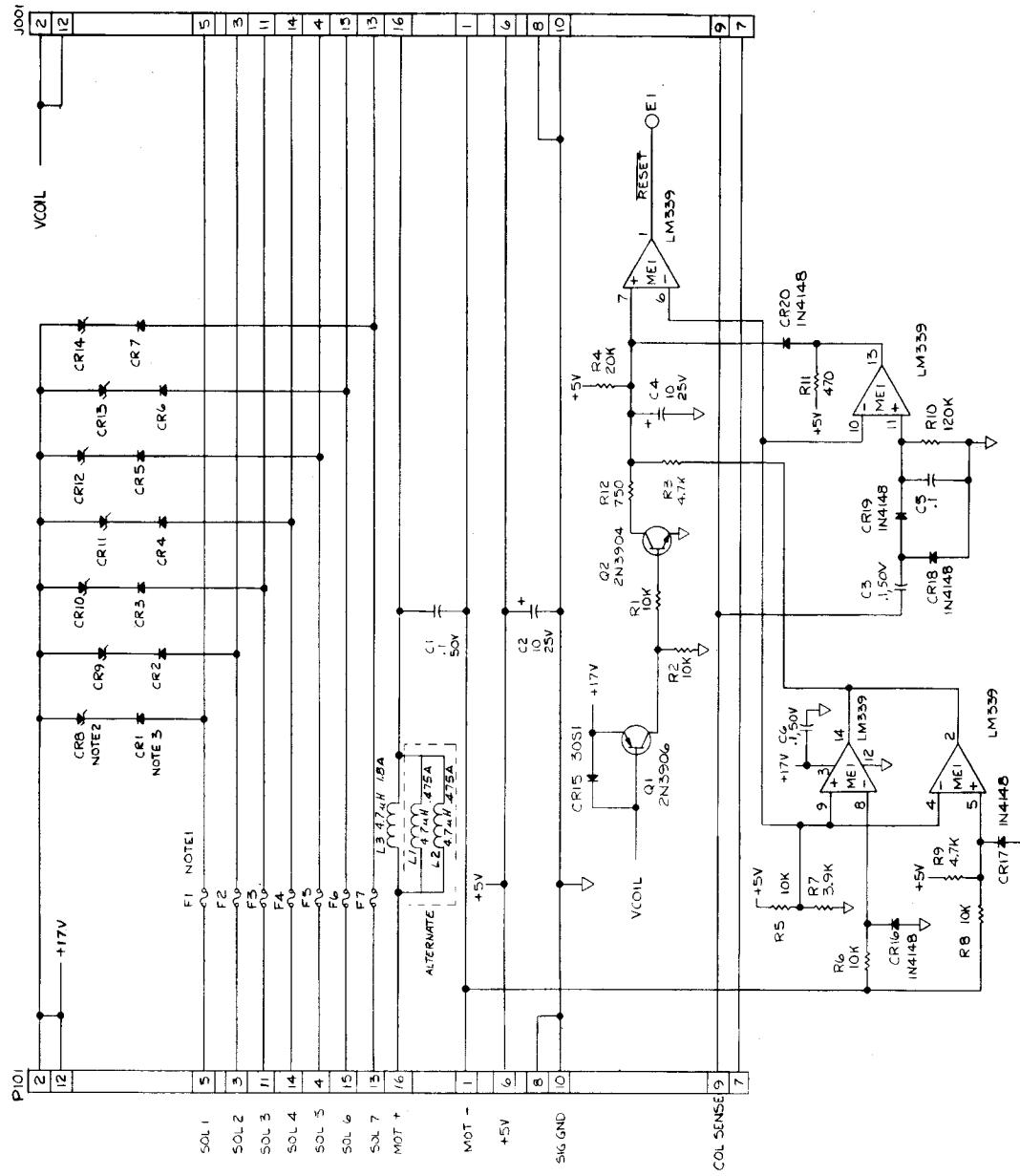
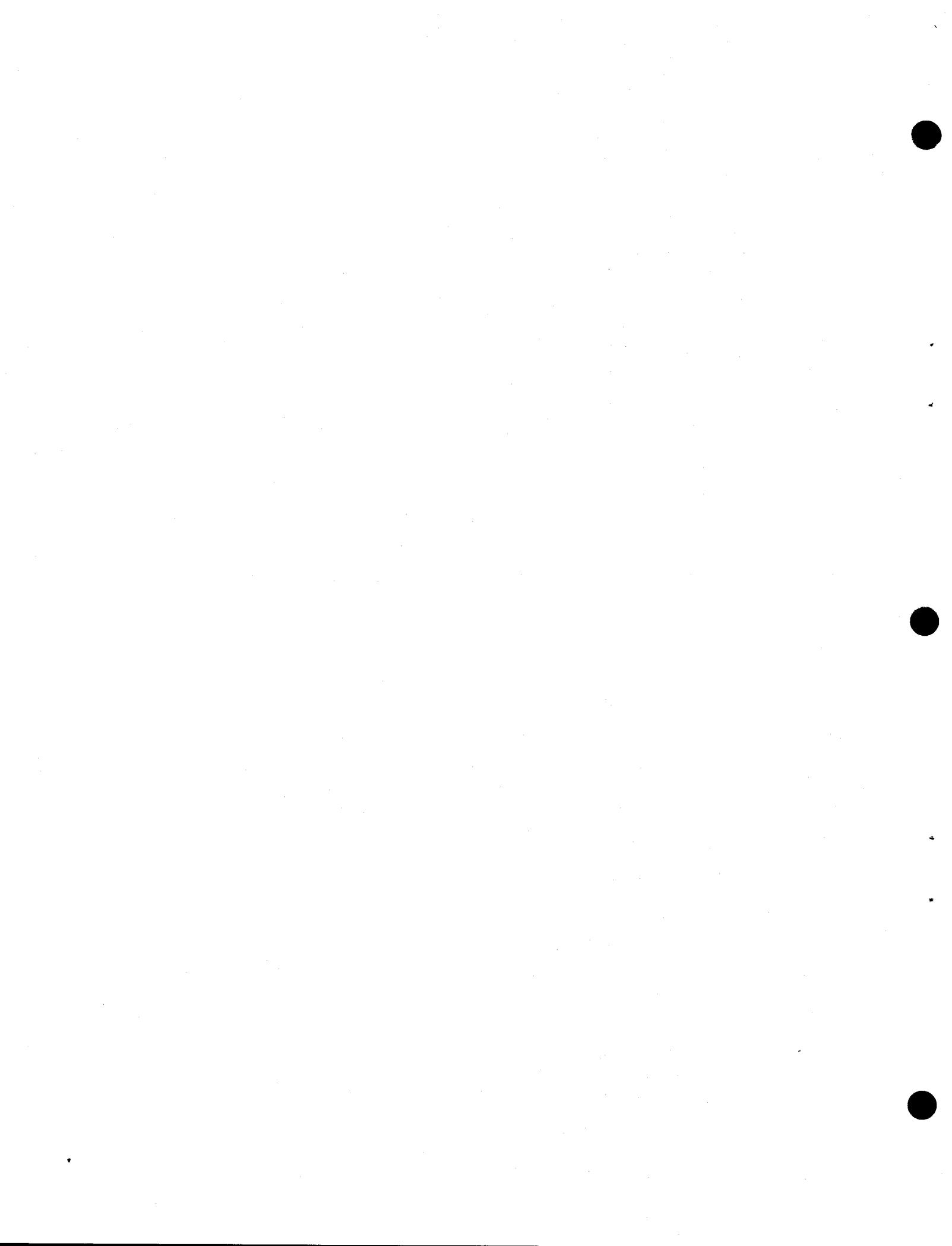


Figure 7-2. SCHEMATIC DIAGRAM, P.C.B. FLYBACK PROTECT BOARD

3.CRI THRU CR7 = IN4002.
2.CRB THRU CR14 = IN4751A
1.F1 THRU F7 = 2.5A.

NOTES:



SECTION 8

ILLUSTRATED PARTS BREAKDOWN

8.1 INTRODUCTION

This section contains the mechanical parts breakdown, electrical parts breakdown and numerical index list for the Line Printer II. The section is organized as follows:

- 8.3 Mechanical Parts Breakdown
- 8.4 Electrical Parts Breakdown
- 8.5 Numerical Index List

8.2 ABBREVIATIONS

The following abbreviations are used in the mechanical and electrical parts breakdowns.

A/R	As Required
Assy.	Assembly
Cer.	Ceramic
Dia.	Diameter
Elctlt.	Electrolytic
Hex.	Hexagon
Hd.	Head
I.C.	Integrated Circuit
in.	inch
Lg.	Long
mm	millimeter
P.C.B.	Printed Circuit Board
Rdl.	Radial
Soc.	Socket
TBAX	Tubular Axial
XSTR	Transistor

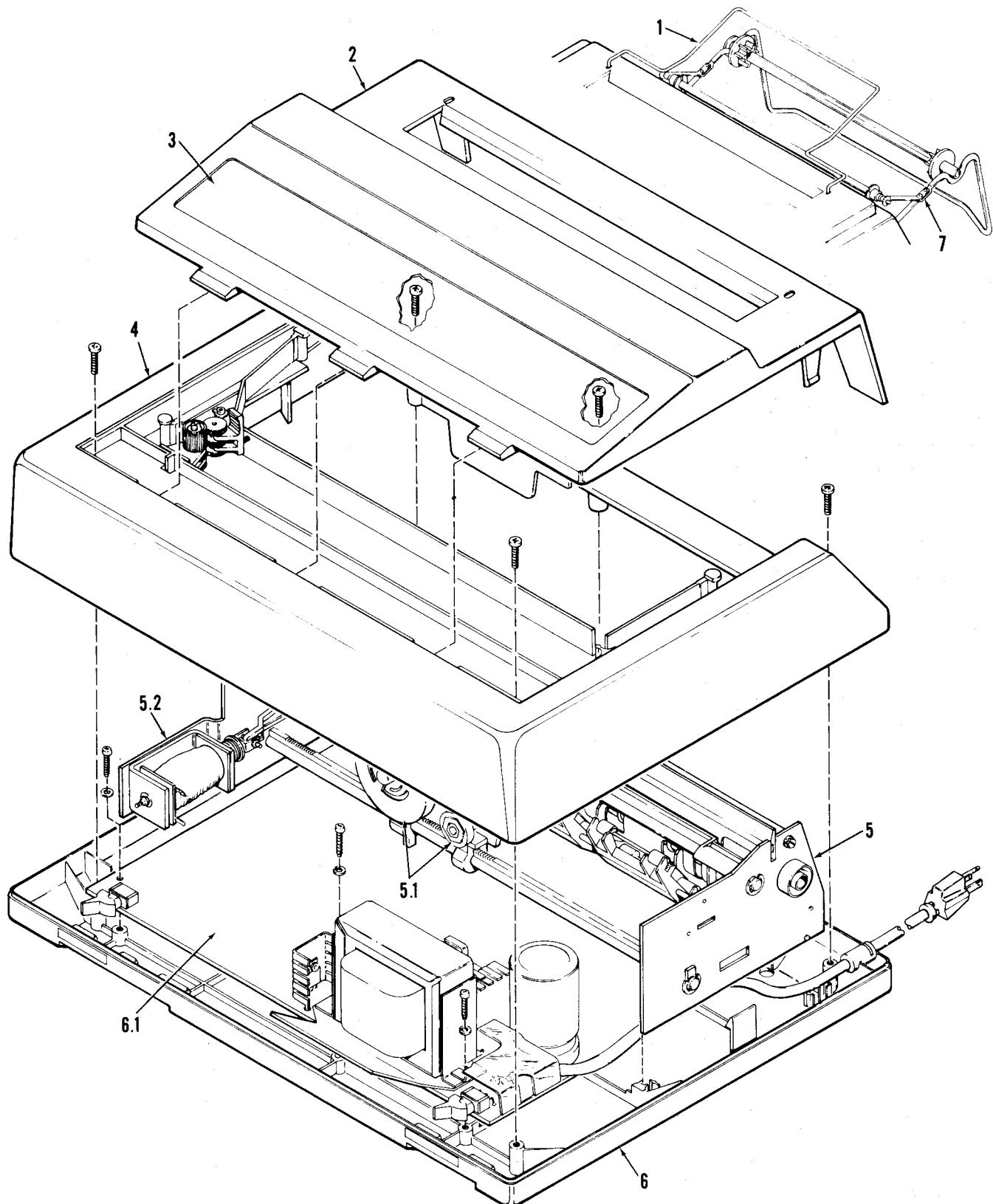
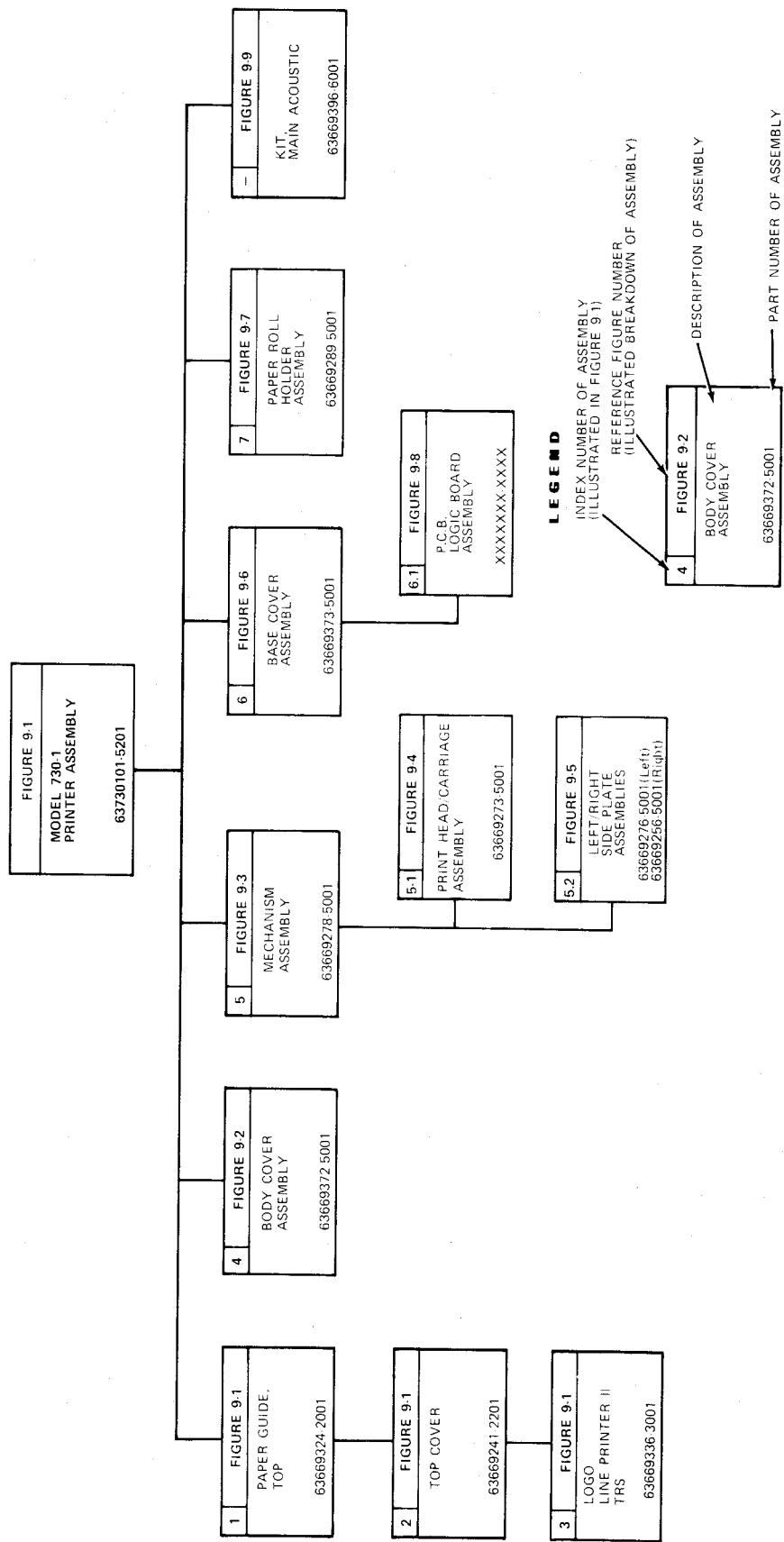


Figure 8-1. LINE PRINTER II



8.3 MECHANICAL PARTS BREAKDOWN

The mechanical parts breakdown is illustrated in Figures 8-1 through 8-8. The breakdown contains illustrations and lists of materials exploding all assemblies and subassemblies down to a piece part level. The four columns of the lists of materials are described below.

8.3.1 FIGURE AND ITEM NUMBER

The first two numbers in the column are the figure numbers and appear at the beginning of each list of material. The third number is the part item number and appears on the illustration. Numbers prefixed with an A (i.e., A1, A2, etc.) present attaching hardware. Item numbers are used to assist in locating a part in the list of materials when a part is visually identified or a part number has been located in the numerical index list.

8.3.2 PART NUMBER

This column contains the manufacturer's part number. Part numbers are used exclusively to identify parts. The last four digits of the part number designate the type of part as follows:

<u>DASH NUMBER</u>	<u>TYPE OF PART</u>
-1XXX	Electrical Piece Part
-2XXX	Mechanical Piece Part
-3XXX	Label, Nameplate, Etc.
-4XXX	Electrical Assembly
-5XXX	Mechanical Assembly
-6XXX	Kit
-9XXX	Reference Material

8.3.3 DESCRIPTION

This column provides a brief description of the indexed part.

8.3.4 QUANTITY

This column indicates the number of piece parts used in the specific assembly or subassembly.

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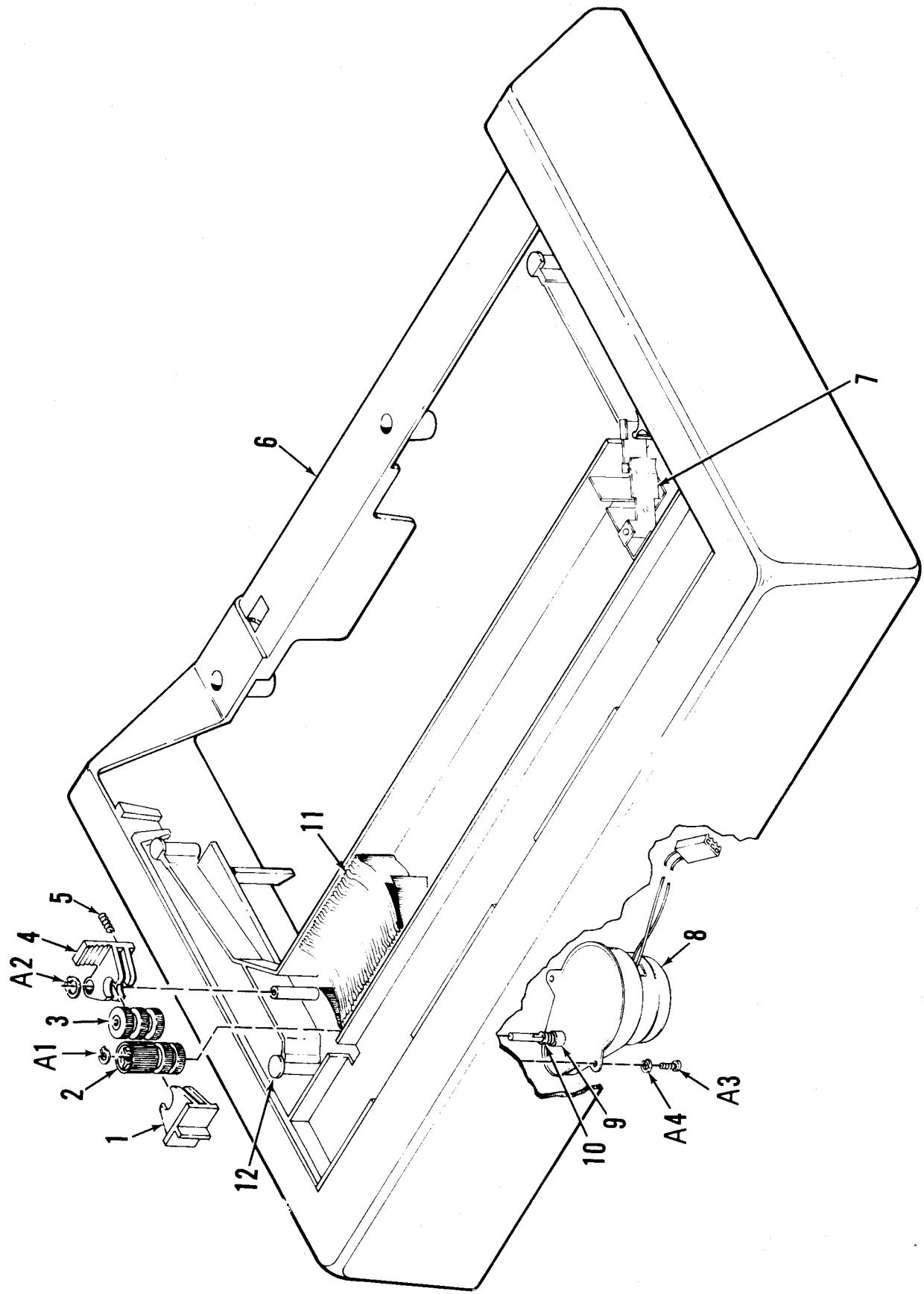


Figure 8-2. BODY COVER ASSEMBLY

LIST OF MATERIALS
BODY COVER ASSEMBLY
(Figure 8-2)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-2-1	63669209-2001	Ribbon Stripper, Drive	1
-2	63669280-2001	Ribbon Roller, Driver	1
-3	63669208-2001	Ribbon Roller, Driver	1
-4	63669210-2001	Pivot, Ribbon Stripper	1
-5	36700028-2002	Spring	1
-6	63669242-5201	Body Cover	1
-7	63669450-5001	Assembly, Ribbon Tensioner	1

NOTE: The ribbon tensioner assembly is made up of items 7.1 through 7.4 which are not called out on Figure 8-2.

-7.1	63669441-2001	Bracket, Ribbon Tensioner	1
-7.2	63669439-2001	Tensioner, Ribbon	1
-7.3	63669437-2001	Hinge Pin, Ribbon Tensioner	1
-7.4	63669448-2001	Spring, Ribbon Tensioner	1
-8	63669271-4001	Assembly, Ribbon Drive Motor, 60 Hz	1

NOTE: The ribbon drive motor assembly is made up of items 8.1 through 8.3 which are not called out on Figure 8-2.

-8.1	30420015-1001	Motor, Ribbon Drive	1
-8.2	31240036-1001	Contact, Connector Crimp, 24-18 AWG	2
-8.3	31343026-1003	Housing, Receptacle, 3 position, 0.045P	1
-9	63669320-2001	Bearing, Thrust	1
-10	63669306-2001	Spring, Ribbon Roller	1
-11	63701468-6003	Kit, Zip-Pack, 12 Ribbons	1
-12	63669319-2001	Button, Ribbon	1

- ATTACHING HARDWARE -

8-2-A1	33115555-2009	Retaining Ring, Ext., 0.185 Shaft	1
-A2	33115555-2013	Retaining Ring, Ext., 0.250 Shaft	1
-A3	34517087-2001	Screw, Pan Hd. Phillips, #4-40 x .25 in. Lg	2
-A4	34000455-2003	Washer, Split Lock, M2.5	2

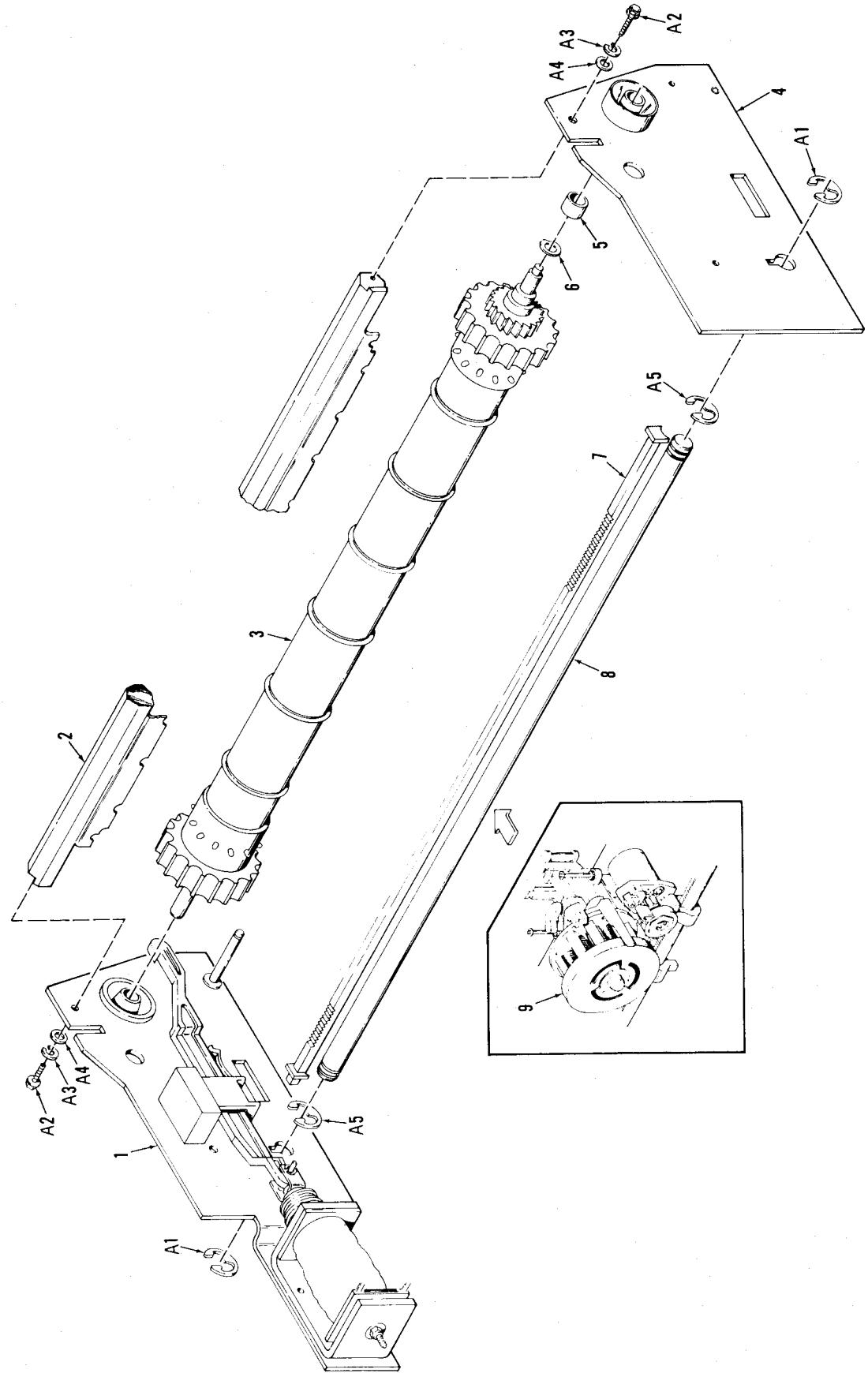


Figure 8-3. MECHANISM ASSEMBLY (SHEET 1)

LIST OF MATERIALS
MECHANISM ASSEMBLY
(Figure 8-3, Sheet 1)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-3-1	63669276-5001	Assembly, Slide Plate, Left	1
-2	63680170-5001	Assembly, Hex Platen, Pinned	1
NOTE: The pinned hex platen assembly is made up of items 2.1 through 2.3 which are not called on on Figure 8-3, Sheet 1.			
-2.1	63680169-2001	Platen, Hex, Pinned	1
-2.2	63680168-2001	Stripper, Paper, Pinned	1
-2.3	34000205-2003	Screw, Round Head, #2 x .25 in. Lg.	3
-3	63680115-5001	Assembly, Pin Feed Rollers	1
NOTE: The pin feed roller assembly is made up items 3.1 through 3.4 which are not called out on Figure 8-3, Sheet 1.			
-3.1	63669288-2001	Paper Roller	1
-3.2	36350009-2001	O-Ring, 0.921 I.D.	6
-3.3	33150000-2009	Dowell Pin, 0.062 Dia. x 0.250 in. Lg.	6
-3.4	63680117-2001	Roller Tractor Drive	2
-4	63669256-5001	Assembly, Side Plate, Right	1
-5	63669305-2001	Spacer, Paper Roller Drive	1
-6	34000190-2017	Washer, Spring, #1/4 x 0.49 O.D.	1
-7	63669240-2001	Rack, Carriage, Molded	1
-8	63669142-2001	Shaft, Carriage	1
-9	63669278-5001	Assembly, Head/Carriage	1
- ATTACHING HARDWARE -			
8-3-A1	33115133-2024	Retaining Ring, Ext., 0.375 Shaft	2
-A2	34527167-2001	Screw, Pan Hd. Phillips, #6-32 x .50 in. Lg.	2
-A3	34828007-2001	Washer, Split Lock, #6	2
-A4	34922107-2001	Washer, Flat #6	2
-A5	33115131-2012	Retaining Ring, Ext. Bow, 0.375 Shaft	2

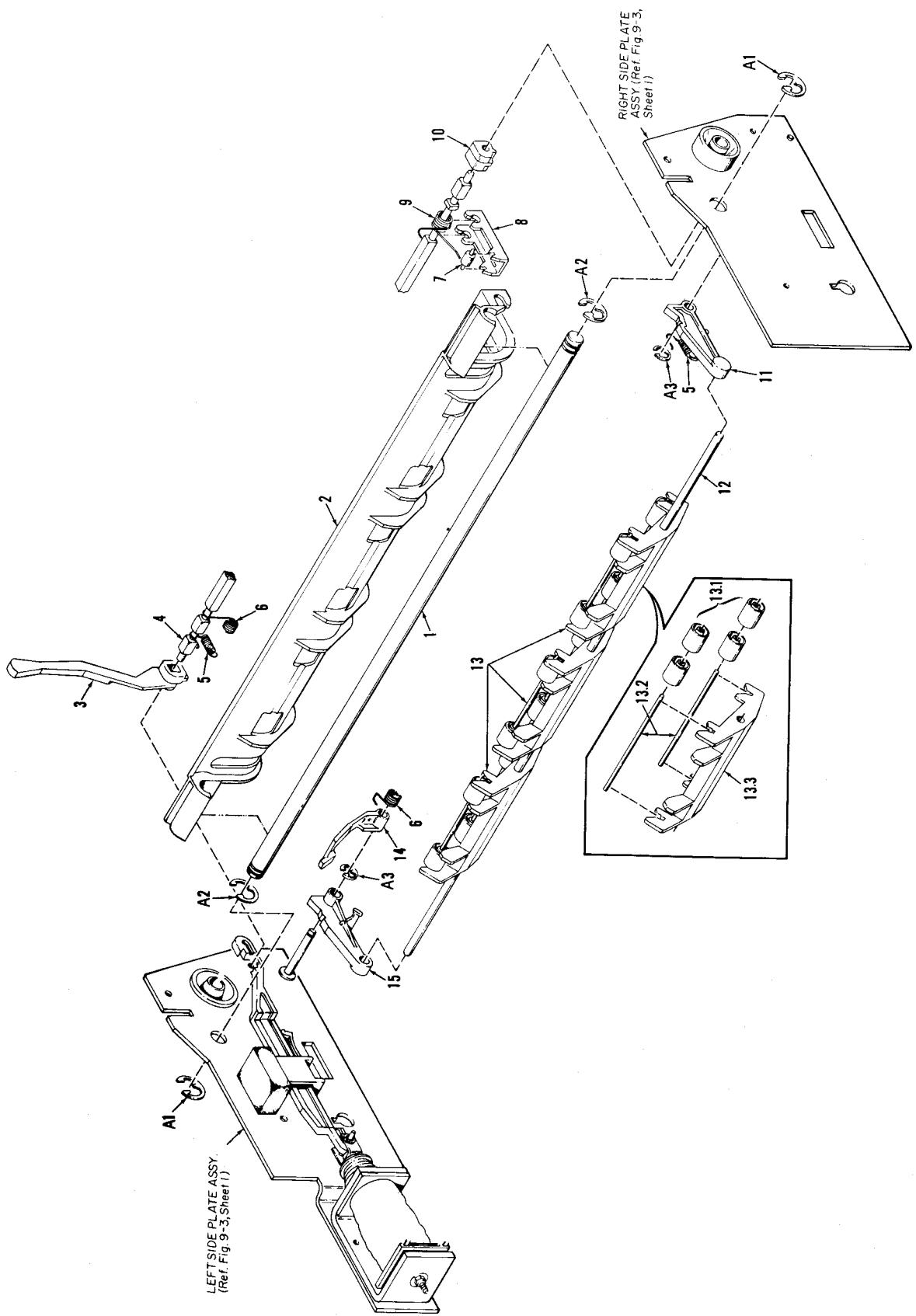


Figure 8-3. MECHANISM ASSEMBLY (SHEET 2)

LIST OF MATERIALS
 MECHANISM ASSEMBLY
 (Figure 8-3, Sheet 2)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-3-1	63669142-2001	Shaft, Carriage, Upper	1
-2	63669255-2001	Full Pan, Paper Feed	1
-3	63669259-2001	Release Lever	1
-4	63669260-2001	Shaft, Release Lever	1
-5	36700033-2001	Spring, Ext. 0.18 Dia. x 0.62 in. Lg.	2
-6	63669379-2001	Spring, Blocker	1
-7	63669196-2001	Roller, Detent	1
-8	63669197-2001	Bracket, Detent	1
-9	63669303-2001	Spring, Detent	1
-10	63669258-2001	Cam, Release	1
-11	63669304-2001	Arm Disengagement, Right	1
-12	63669202-2001	Shaft, Yoke Pivot	1
-13	63669254-5001	Assembly, Paper Pinch Rollers	3
NOTE: The paper pinch rollers assembly is made up items 13.1 through 13.3.			
-13.1	63669167-2001	Roller	12
-13.2	63669322-2001	Shaft, Roller	6
-13.3	63669235-2001	Yoke	3
-14	63669385-2001	Blocker, Line Feed	1
-15	63669304-2002	Arm Disengagement, Left	1

- ATTACHING HARDWARE -

8-3-A1	33115133-2024	Retaining Ring Ext. 0.375 Shaft	2
-A2	33115131-2020	Retaining Ring Ext. Bow 0.375 Shaft	2
-A3	33115133-2020	Retaining Ring Ext. 0.188 Shaft	2

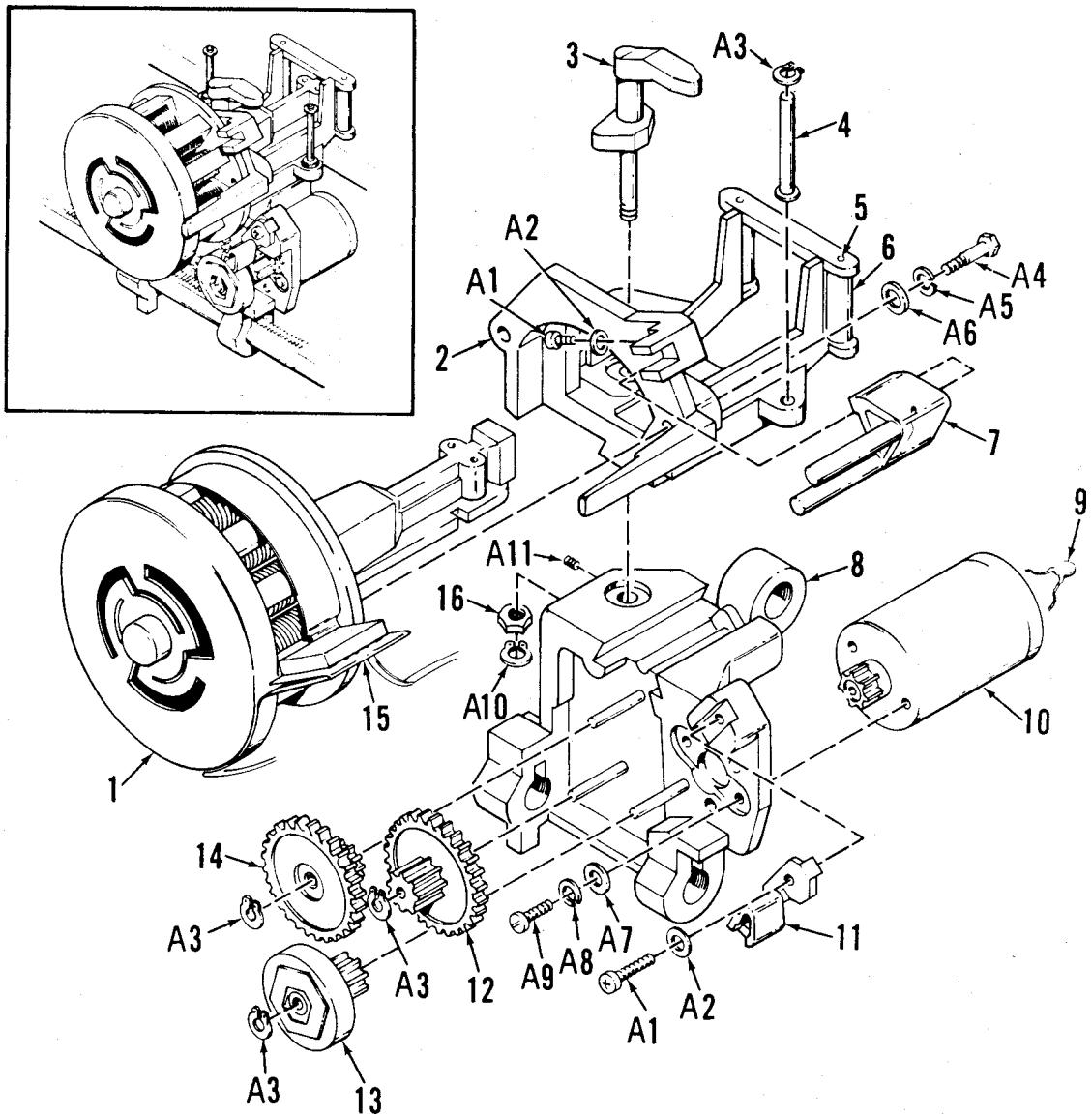


Figure 8-4. PRINT HEAD/CARRIAGE ASSEMBLY

LIST OF MATERIALS
PRINT HEAD/CARRIAGE ASSEMBLY
(Figure 8-4)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-4-1	62001100-5005	FF Head Assembly, 7 Wire Flex Circuit	1
-2	63669279-2001	Head Adaptor	1
-3	63669262-2001	Cam, Head Gap Adjustment	1
-4	63669311-2004	Shaft, Ribbon Roller	2
-5	63669321-2001	Pin Ribbon Roller	2
-6	63669315-2001	Ribbon Roller, Head Adaptor	2
-7	63669330-2001	Adapter, Flex Circuit	1
-8	63669555-5001	Assembly, Carriage and Shafts	1
-9	211010001-1001	Capacitor, Ceramic Disc, 100 pf, 1KV, 20%	1
-10	63669264-4001	Assembly, Motor Drive	1
NOTE: The motor drive assembly is made up of items 10.1 and 10.2 which are not called out on Figure 8-4.			
-10.1	30420014-1001	Motor, Carriage Drive	1
-10.2	63669263-2001	Pinion, Motor	1
-11	63669327-2001	Holder Sensor	1
-12	63669185-2001	Gear Cluster, 16/60	1
-13	63669267-5001	Assembly, Rotor	1
NOTE: The rotor assembly is made up of items 13.1 and 13.2 which are not called out on Figure 8-4.			
-13.1	63669266-2001	Gear, Rotor	1
-13.2	63669295-2001	Magnetic Rotor, Large Hex	1
14	63669186-2001	Gear Cluster, 16/56	1
15	63669338-4001	Assembly, Ribbon Cable 7 Wire Hd.	1
16	63669316-2001	Bushing, Eccentric Carriage	1
- ATTACHING HARDWARE -			
8-4-A1	34004407-2001	Screw, Cruciform Head, .50 in. Lg.	2
-A2	34912087-2001	Washer, Flat, #4	2
-A3	33115100-2002	Retaining Ring, Ext. 0.125 in. Shaft	5
-A4	34136237-2001	Screw, Cap, Hex hd. #8-32 x .72 in. Lg.	2
-A5	34838007-2001	Washer, Split Lock, #8	2
-A6	34933126-2001	Washer, Flat, #8	2
-A7	34000452-2003	Washer, Flat, M2	2
-A8	34000455-2003	Washer, Split Lock, M2.5	2
-A9	34000352-2022	Screw, Fillister Head Slotted, M2 x 8 mm Lg.	2
-A10	33115555-2009	Retaining Ring, Ext., 0.185 Shaft	1
-A11	33922061-2001	Set-Screw, Cup Point, #6-32 x .187 in. Lg.	1

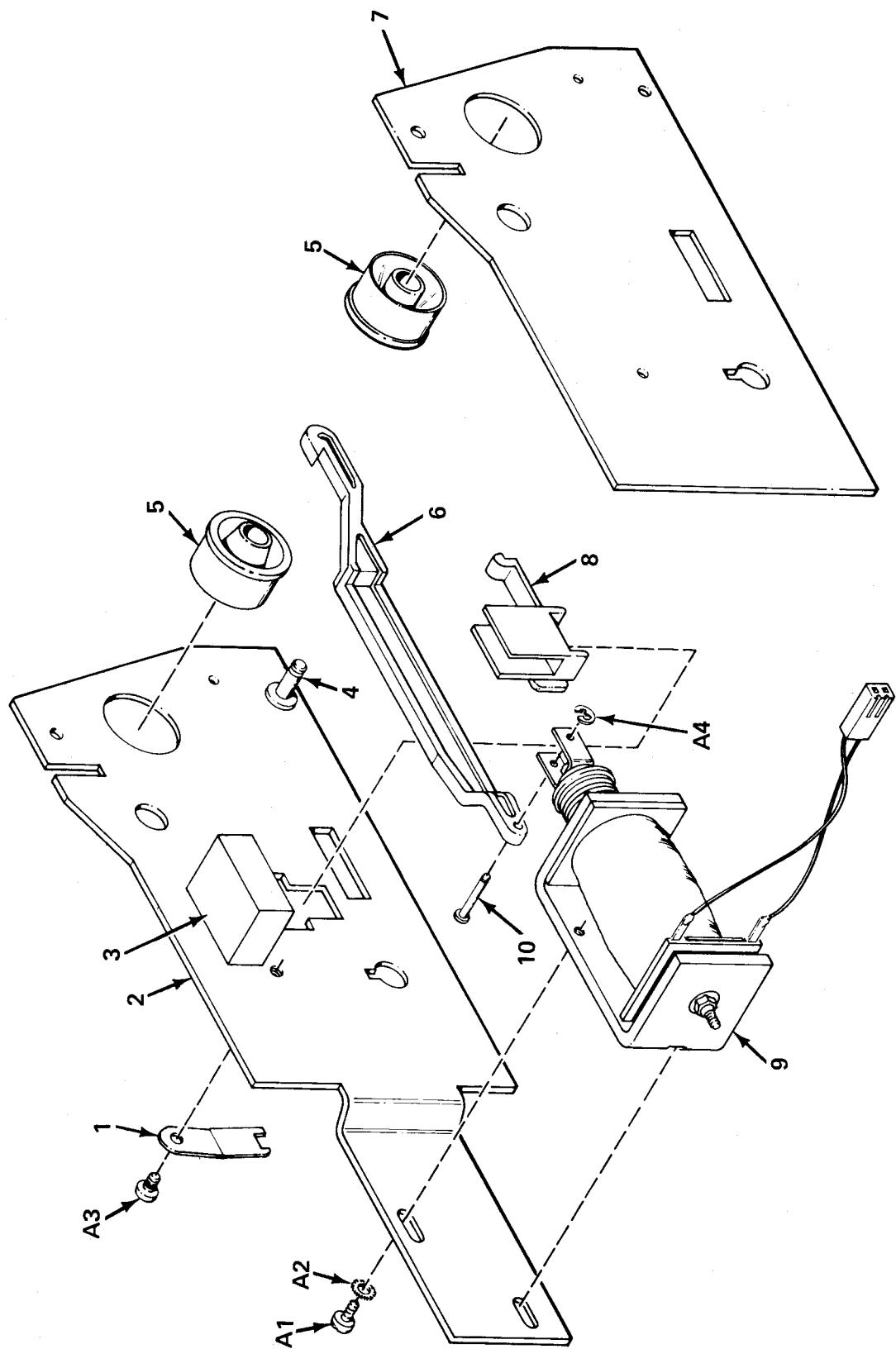


Figure 8-5. LEFT/RIGHT SIDE PLATE ASSEMBLIES

LIST OF MATERIALS
LEFT/RIGHT SIDE PLATE ASSEMBLIES
(Figure 8-5)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-5-1	63669205-2001	Clip, Spring	1
-2	63669187-2001	Side Plate, Left	1
-3	63669342-2001	Bumper Pad	2
-4	63669312-5002	Assembly, Hinge Pin	2
NOTE: The hinge pin assembly is made up of items 4.1 and 4.2 which are not called out in Figure 8-5.			
-4.1	63669427-2001	Hinge Pin	2
-4.2	63669313-2001	Washer, Hinge Pin	2
-5	36000045-2001	Bushing, Nylon, 0.252 I.D.	2
-6	63669190-2001	Ratchet Pawl	1
-7	63669183-2001	Side Plate, Right	1
-8	63669236-2001	Pawl Guide, Molded	1
-9	63669287-4001	Assembly, Solenoid	1
NOTE: The solenoid assembly is made up of items 9.1 through 9.6 which are not called out in Figure 8-5.			
-9.1	30458629-1001	Switch, Solenoid, Size F	1
-9.2	34000079-2001	Nut, Hex, Nylon, #5-40	1
-9.3	39648505-0007-9	Wire, Type B, 20 AWG, White	1
-9.4	31240036-1001	Contact, Connector Crimp, 24-18 AWG	2
-9.5	31343026-1002	Housing, Receptacle, 2 Position	1
-9.6	36350010-2001	O-Ring, 0.114 I.D.	1
-10	63669557-2001	Clevis Pin, Solenoid	1
- ATTACHING HARDWARE -			
8-5-A1	34000202-2001	Screw, Hex Hd., #8-32 x .25 in. Lg.	2
-A2	34000451-2056	Washer, Split Lock, Ext. Tooth, M4	2
-A3	34000105-2001	Screw, Self Threading, #6-32	1
-A4	33115116-2009	Retaining Ring, Ext. 0.091 Shaft	1

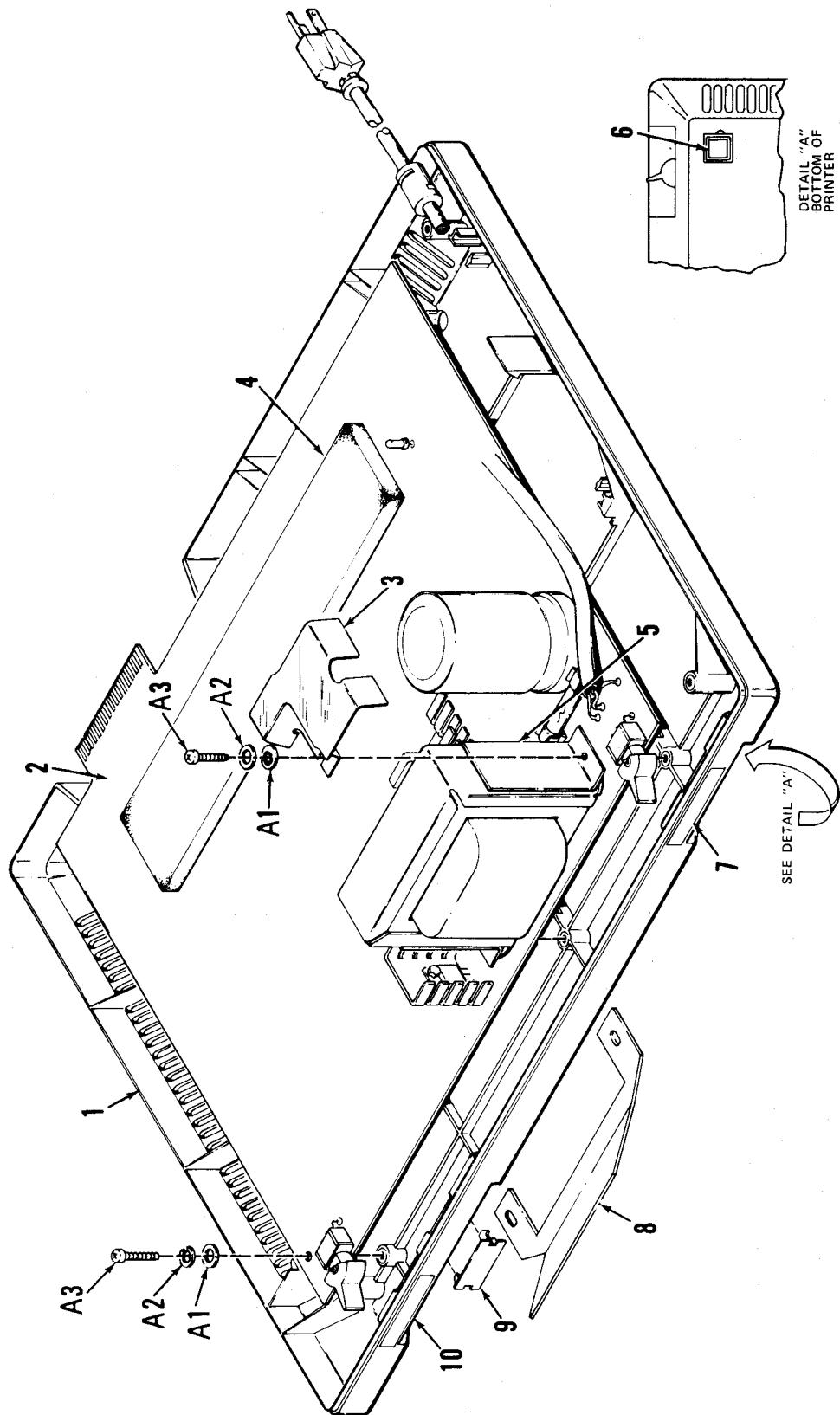


Figure 8-6. BASE COVER ASSEMBLY

LIST OF MATERIALS
BASE COVER ASSEMBLY
(Figure 8-6)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-6-1	63669243-5070	Base Cover	1
-2	-	P.C.B., Logic Board Assembly	1
-3	63669348-2002	Shield, High Voltage	1
-4	63669395-2001	Foam, P.C. Board	1
-5	63669480-2001	Shield, Transformer	1
-6	36350051-2001	Bumper, 0.12 in. x 0.50 in.	4
-7	63669349-3001	Label, Power	1
-8	63669412-2001	Heat Shield, Transformer	1
-9	63669326-2001	Cap, Base Cover	1
-10	63669350-3001	Label, Reset	1
- ATTACHING HARDWARE -			
8-6-A1	34922105-2001	Washer, Flat #6	3
-A2	34825007-2001	Washer, Split Lock, Int. Tooth #6	3
-A3	34527167-2001	Screw, Pan Hd. Phillips, #6-32 x .50 in. Lg.	3

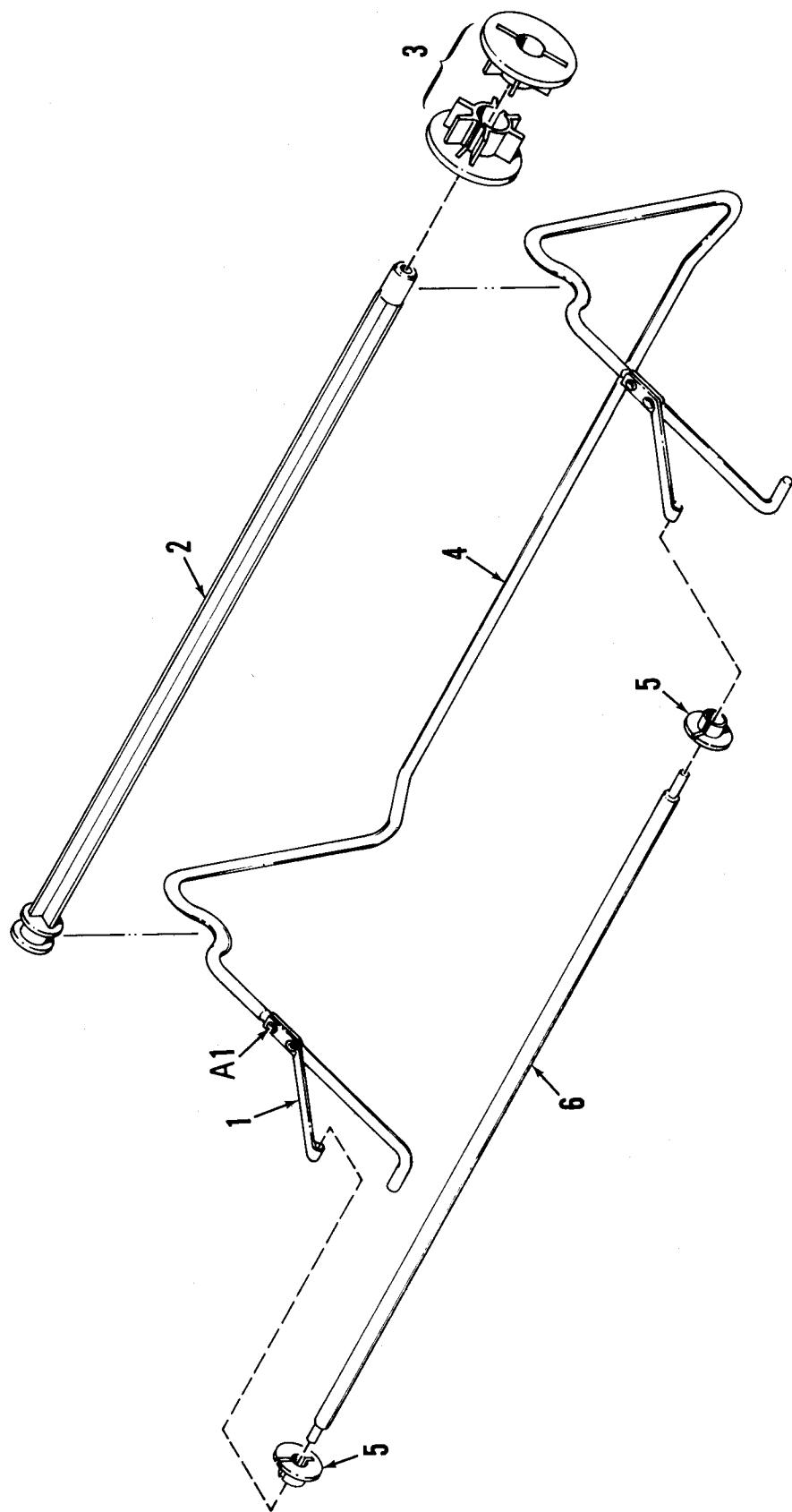


Figure 8-7. PAPER ROLL HOLDER ASSEMBLY

LIST OF MATERIALS
PAPER ROLL HOLDER ASSEMBLY
(Figure 8-7)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-7-1	63669294-2001	Spring, Dancer	2
-2	63669292-2001	Axle, Roll Paper	1
-3	63669293-2001	Hub, Roll Paper	2
-4	63669290-2001	Holder, Roll Paper	1
-5	81700332-2001	Paper Guide	2
-6	63669291-2001	Dancer Bar	1
- ATTACHING HARDWARE -			
8-7-A1	33490001-2001	Eyelet, Flange	4

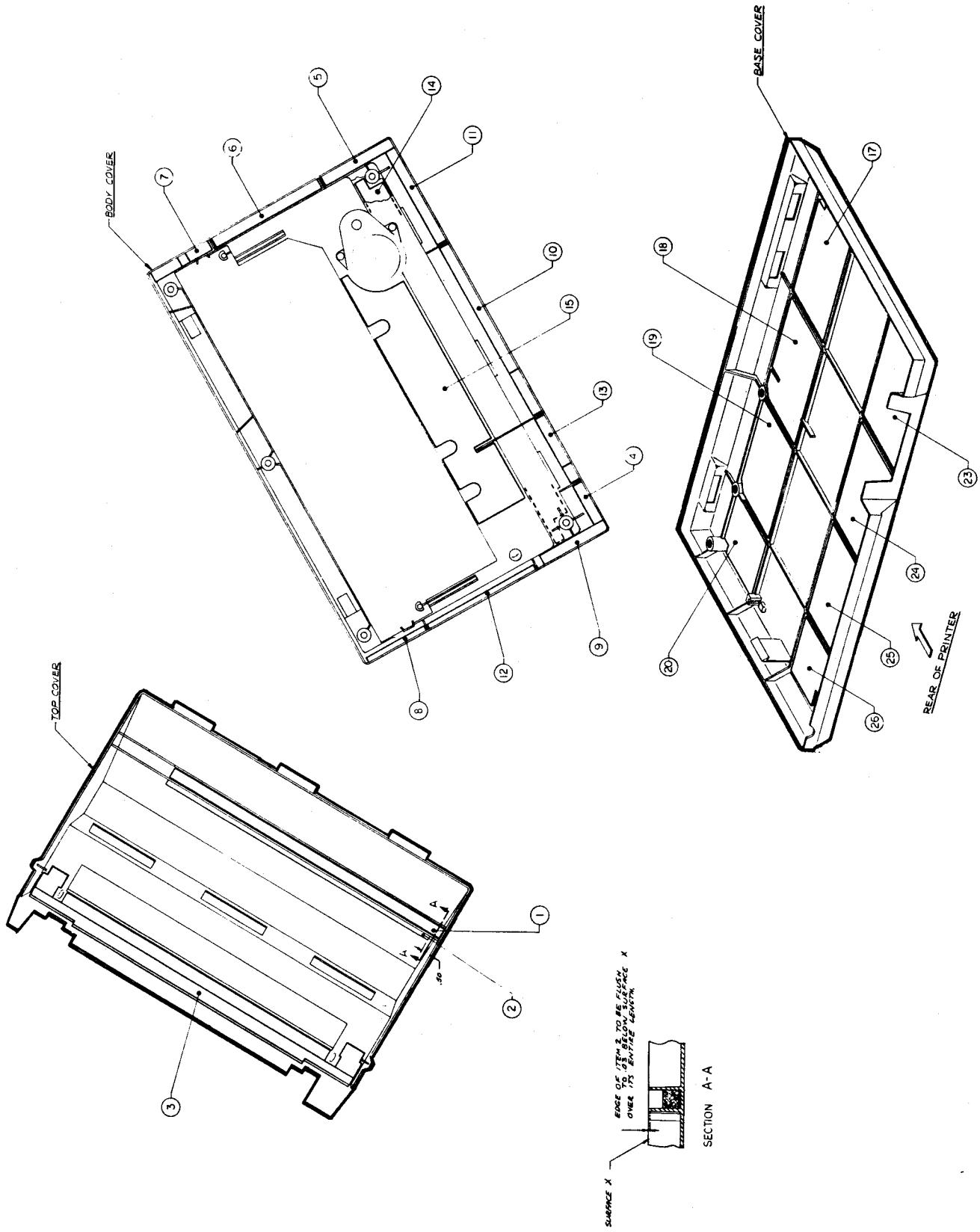


Figure 8-8. KIT, MAIN ACOUSTIC

LIST OF MATERIALS
KIT, MAIN ACOUSTIC
(Figure 8-8)

ITEM	PART NUMBER	DESCRIPTION	QTY.
8-8-1	63669382-2001	Foam, Top Cover, Front	1
-2	63669383-2001	Foam, Top Cover, Middle	1
-3	63669384-2001	Foam, Top Cover, Rear	1
-4	63669380-2002	Foam, Body Cover, Right, Front Cover	1
-5	63669388-2001	Foam, Body Cover, Side Corner	1
-6	63669391-2001	Foam, Body Cover, Side	1
-7	63680138-2001	Foam, Body Cover, Rear Corner	1
-8	63680140-2001	Foam, Body Cover, Rear Corner, Pulley Side	1
-9	63680141-2001	Foam, Body Cover, Front Cover	1
-10	63669389-2001	Foam, Body Cover, Front Middle	1
-11	63669390-2001	Foam, Body Cover, Left, Front Corner	1
-12	63680137-2001	Foam, Body Cover, Pulley Side	1
-13	63669392-2001	Foam, Body Cover, Front	1
-14	63669393-2001	Foam, Body Cover, Top	1
-15	63680139-2001	Foam, Body Cover, Middle	1
-16	63669400-2001	Foam, Base, Left, Front Corner	1
-17	63669401-2001	Foam, Base, Left, Front, Middle	1
-18	63669402-2001	Foam, Base, Right, Front, Middle	1
-19	63669403-2001	Foam, Base, Right, Front Corner	1
-20	63669406-2001	Foam, Base, Left, Rear Corner	1
-21	63669407-2001	Foam, Base, Left, Rear	1
-22	63669407-2002	Foam, Base, Right, Rear	1
-23	63669408-2001	Foam, Base, Right, Rear Corner	1

8.4 ELECTRICAL PARTS BREAKDOWN

The electrical parts breakdown is shown in Figure 8-9. This breakdown contains an illustration and list of material for the printed circuit board used in the printer. The four columns of the electrical parts breakdown is identical to the mechanical parts breakdown. Those items not called out by item numbers are identified by a reference designator. The following abbreviations are used as reference designators.

<u>REFERENCE DESIGNATOR</u>	<u>TYPE OF PART</u>
C	Capacitor
CR	Diode
F	Fuse
J	Connector (jack)
ME	Integrated Circuit
P	Connector (plug)
R	Resistor
S1	Sensor Assembly
SW	Switch
VR	Voltage Regulator
Y1	Oscillator

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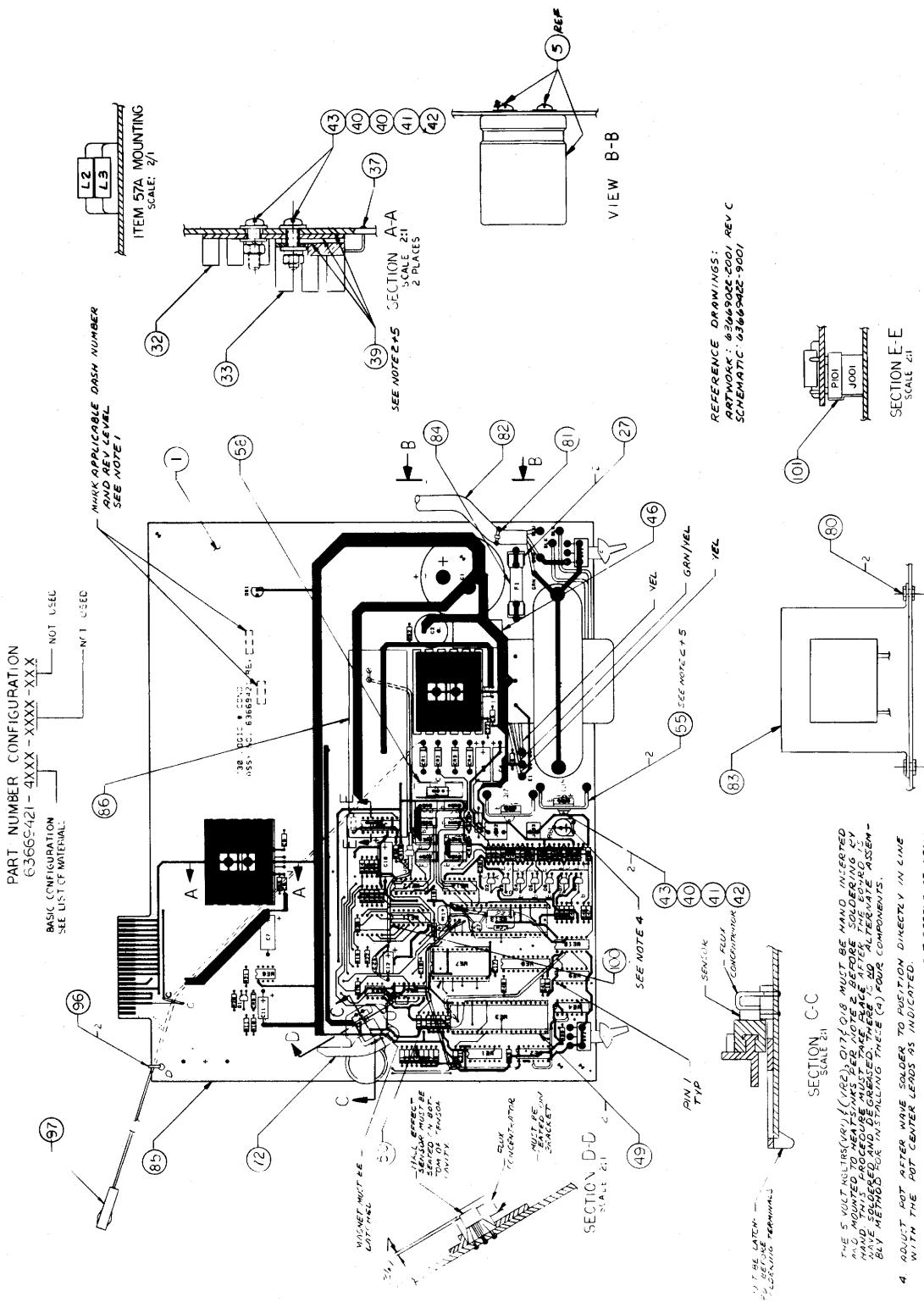


Figure 8-9. LOGIC P.C.B. ASSEMBLY

LIST OF MATERIALS
LOGIC P.C.B. ASSEMBLY
(Figure 8-9)

ITEM	PART NUMBER	DESCRIPTION	QTY.
1	63669022-2001	PCB AW, 730 Logic, w/Condensed	1.0000
2	38045400-1900	Semicond Diode Rect IN5400 BT	4.0000
3	38052370-1900	Semicond Diode TBAX 8.2 IN5237BT	1.0000
4	38100904-1900	Semicond Diode TBAX IN4148 BT	5.0000
5	63669380-6001	Kit, Capacitor Metric Thread U	1.0000
6	22108006-1001	Cap Elect 1000 MF 25V -10 +50%	1.0000
7	21102002-1001	Cap TBAX Glass or Epoxy 1000PF	1.0000
8	21104005-1001	Cap TBAX .1UF 50V -20 +80%	12.0000
9	22105002-1001	Cap ELCTLT 1UF 25V -10 +75%	1.0000
10	22106003-1001	Cap ELCTLT 10MF 16V -10 +75%	3.0000
11	38263880-1900	Semicond XSTR NPN Pwr 2N6388BT	8.0000
12	38239060-1900	Semicond XSTR PNP GP 2N3906 BT	4.0000
13	38239040-1900	Semicond XSTR GP 2N3904 BT	2.0000
14	38201200-1900	Semicond XSTR NPN Pwr TIP120BT	1.0000
15	38201252-1900	Semicond XSTR PNP Pwr EP3011BT	1.0000
16	38245062-1900	Semicond XSTR 2N5062BT	2.0000
17	35205550-1900	IC Linear Timer 555BT	1.0000
18	35674273-1900	IC Octal D-Type FF 74LS273BT	1.0000
19	35474070-1900	IC Hex Buffer/Driver 7407BT	2.0000
20	35474740-1900	IC Dual D-Type FF 7474BT	2.0000
21	35474040-1900	IC Hex Inverter 7404BT	3.0000
22	41271926-1001	Res Carbon 270 Ohm 1/4W 10%	2.0000
23	46101502-1001	Pot Single Turn 1K	1.0000
24	41222925-1001	Res Carbon 2.2K Ohm 1/4W 5%	3.0000
25	41000926-1001	Res Carbon 0 Ohm 1/4W 10%	1.0000
26	39090010-1001	Sw PC RT Angle Mount SPDT	2.0000
27	31350003-2001	Clip Fuse w/Ear PC Mtg .25 Dia	2.0000
28	31410247-2003	Socket IC 16 Pin Sldr Dip .300W	1.0000
29	31301029-1003	Header 3 Posn Lkg PC Mtg .045P	1.0000
30	31301029-1002	Header 2 Posn Lkg PC Mtg .045P	1.0000
32	32860005-2001	Heat Sink to-220 Base	2.0000
33	32860005-2002	Heat Sink to-220 Top	2.0000
38	38100211-1001	Semicond Led w/Leads	1.0000
40	34000453-2003	Wshr Fl M2.5x6.5 0.5 Thk SST SI	6.0000
41	34000454-2003	Wshr Lock Split M2.5 SST	4.0000
42	34000651-2003	Nut Hex M2.5x0.45x2 Thk SST SI	4.0000
43	34000359-2087	SCR CHZ Sltd M2.5x0.45x10 SST	4.0000
44	37810690-1001	Crystal 6 Mz	1.0000
45	38040020-1900	Semicond Diode TBAX IN4002 BT	6.0000
46	62000111-3001	Warning Decal Fuse Rating	1.0000
47	22106002-1001	Cap ELCTLT 10UF 25V +10 +75%	1.0000
48	63669503-4003	I/C Assembly 8039	1.0000
48A	63669503-4002	I/C Assembly 8049	A/R
49	31410762-1040	Skt IC 40 Pin Sldr Dip .600W TP	2.0000
50	31410762-1024	Skt IC 24 Pin Sldr Dip .600W TP	1.0000
51	35207800-1900	IC Voltage Regulator 7805 BT	2.0000
52	35207812-1900	IC Voltage Rgltr +12V 7812 BT	1.0000
53	41102926-1001	Res Carbon 1K Ohm 1/4W 10%	19.0000
54	41472926-1001	Res Carbon 4.7K Ohm 1/4W 10%	4.0000
55	32860010-2001	Heat Sink 1.18H x 1.0W PC Vert	2.0000
56	41122925-1001	Res Carbon 1.2K Ohm 1/4W 5%	1.0000
57	30410011-1009	Inductor 4.7UH Hvy Dty	1.0000

LIST OF MATERIALS
LOGIC P.C.B. ASSEMBLY
(Figure 8-9)
(cont'd)

ITEM	PART NUMBER	DESCRIPTION	QTY.
58	32860009-2001	Heat Sink Xistor to-220	1.0000
61	35674174-1900	IC Hex D Type FF 74LS174 BT	1.0000
62	41103926-1001	Res Carbon 10K Ohm 1/4W 10%	15.0000
63	41155926-1001	Res Carbon 1.5M Ohm 1/4W 10%	1.0000
64	22205000-1001	Cap ELCTLT 2UF 25V +10 +75%	1.0000
65	35474320-1900	IC QUADR or 2-Input 7432BT	1.0000
67	35202316-1007	IC ROM Code 2316 P730C0.015	A/R
68	35578156-1001	IC 2048-B Rndm Access Mem 8156	1.0000
69	41821926-1001	Res Carbon 820 Ohm 1/4W 10%	8.0000
70	41152926-1001	Res Carbon 1.5K Ohm 1/4W 10%	1.0000
71	41201926-1001	Res Carbon 200 Ohm 1/4W 10%	1.0000
72	63669438-5001	Assy, RTP Switch	1.0000
76	41151926-1001	Res Carbon 150 Ohm 1/4W 10%	1.0000
77	39092508-1001	Switch Block 4 Posn PC Mtg	1.0000
78	21103007-1001	Cap Cer Disc .01UF 50V 20%	1.0000
79	21120000-1001	Cap Cer Disc 12PF 500V 20%	1.0000
80	33490001-2014	Eyelet Flange .183D x .156L BRS 4B	2.0000
81	39695333-2002	Strap Cable Adj Lkg 1.12BDL	1.0000
82	39660041-1001	Cord 3/C 18 AWG w/P1 73 IN.	1.0000
83	30468359-1001	Xfmr 117V /25.2V CT	1.0000
84	39030000-1001	Fuse GL .25 Dia 1A Slow 1.25L	1.0000
85	63669421-4000	PCB A, 730 Lgc, w/Cond PRL, Basic	1.0000
86	63669515-4001	PCB A 730 Flyback Protect Bd	1.0000

REFERENCE DESIGNATORS
P.C.B. LOGIC BOARD ASSEMBLY
(Figure 8-9)

ITEM	REFERENCE DESIGNATOR
2	CR1, CR2, CR3, CR4
3	CR10
4	CR9, CR14, CR15, CR16, CR17
5	C1
6	C2
7	C13
8	C5, C6, C8, C9, C15, C16, C18, C19, C20, C21, C22, C17
9	C12
10	C4, C7, C10
11	Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16
12	Q3, Q5, Q6, Q8
13	Q4, Q7
14	Q18
15	Q17
16	Q2, Q1
17	ME6
18	ME8
19	ME12, ME14
20	ME4, ME5
21	ME1, ME2, ME9

REFERENCE DESIGNATORS
P.C.B. LOGIC BOARD ASSEMBLY
(Figure 8-9)
(cont'd)

ITEM	REFERENCE DESIGNATOR
22	R38, R62
23	R61
24	R45, R49, R53
25	R59
26	SW1, SW2
28	J001
29	J002
30	J003
38	DS1
44	Y1
45	CR12, CR13, CR5, CR6, CR7, CR8
47	C3
48	ME13
51	VR1, VR3
52	VR2
53	R10, R11, R12, R18, R19, R20, R22, R23, R33, R40, R41, R42, R46, R48, R51, R55, R57, R58, R43
54	R44, R47, R50, R56
56	R52
57	L1
61	ME11
62	R1, R2, R3, R4, R5, R6, R7, R8, R9, R14, R15, R17, R39, R63, R16
63	R21
64	C11
65	ME10
67	ME7
68	ME3
69	R29, R30, R31, R32, R34, R35, R36, R37
70	R54
71	R65
76	R64
77	SW3
78	C23
79	C24
100	J004

8.5 NUMERICAL INDEX LIST

The numerical index list contains all mechanical and electrical parts cross-referenced with a figure and item number. The numerical index contains the four columns described below.

8.5.1 PART NUMBER

This column contains the numerical listing of all mechanical and electrical parts used in the printer.

8.5.2 DESCRIPTION

This column provides a brief description of the indexed part.

8.5.3 FIGURE AND ITEM NUMBER

This column contains the corresponding figure and item numbers for all parts listed enabling the user to identify a known part on an illustration.

8.5.4 QUANTITY

This column contains the quantity of the part required on the figure and item number called out.

PART NUMBER	DESCRIPTION	FIGURE NUMBER	INDEX NUMBER	QTY.
21101001-1001	Capacitor, Ceramic Disc, 100 pf, 1K, 20%	8-4	9	1
21102002-1001	Cap TBAX Glass or Epoxy 1000 pf	8-9	7	1
21103007-1001	Capacitor, Ceramic Disc 0.01 uf, 50V, 20%	8-9	78	1
21104005-1001	Capacitor, TBAX, 0.1 uf 50V, -20 +80%	8-9	8	12
21120000-1001	Capacitor, Ceramic Disc, 12 pf, 500V, 20%	8-9	79	1
22105002-1001	Capacitor, ELCTLT, 1 uf 25V, -10 +75%	8-9	9	1
22106002-1001	Capacitor, ELCTLT, 10 uf, 25V, -10 +75%	8-9	47	1
22106003-1001	Capacitor, ELCTLT, 10 mf, 16V, -10 +75%	8-9	10	3
22108006-1001	Cap, Elect, 1000 mf, 25V, -10 +50%	8-9	6	1
22205000-1001	Capacitor, ELCTLT, 2 uf, 25V, -10 +75%	8-9	64	1
30410011-1009	Inductor 4.7 UH Hvy Dty	8-9	57	1
30420014-1001	Motor, Carriage Drive	8-4	10.1	1
30420015-1001	Motor, Ribbon Drive	8-2	8.1	1
30458629-1001	Switch, Solenoid, Size F	8-5	9.1	1
30468359-1001	Xfmr, 117V/25.2V CT	8-9	83	1
31240036-1001	Contact, Connector Crimp 24-18 AWG	8-2	8.2	2
31240036-1001	Contact, Connector Crimp 24-18 AWG	8-5	9.4	2
31301029-1002	Header, 2 Posn, PC Mtg	8-9	30	1
31301029-1003	Header, 3 Posn, PC Mtg	8-9	29	1
31343026-1003	Housing, Receptacle, 3 Position 0.045P	8-2	8.3	1
31343026-1002	Housing, Receptacle, 2 Position	8-5	9.5	1
31350003-2001	Clip Fuse w/Ear, PC Mtg 0.25 Dia.	8-9	27	2
31410247-2003	Socket I.C. 16 Pin	8-9	28	1
31410762-1024	Skt., IC 24 Pin	8-9	50	1
31410762-1040	Skt., I.C., 40 Pin	8-9	49	2
32860005-2001	Heat Sink to-220 Base	8-9	32	2
32860005-2002	Heat Sink to-220 Top	8-9	33	2
32860009-2001	Heat Sink Xistor to-220	8-9	58	1
32860010-2001	Heat Sink	8-9	55	2
33115100-2002	Retaining Ring, Ext. 0.125 Shaft	8-4	A3	5
33115116-2009	Retaining Ring, Ext. 0.091 Shaft	8-5	A4	1
33115131-2012	Retaining Ring, Ext. Bow 0.375 Shaft	8-3/1	A5	2
33115131-2020	Retaining Ring, Ext. Bow 0.375 Shaft	8-3/2	A2	2
33115133-2020	Retaining Ring, Ext. 0.188 Shaft	8-3/2	A3	2
33115133-2024	Retaining Ring, Ext. 0.375 Shaft	8-3/1	A1	2
33115133-2024	Retaining Ring, Ext. 0.375 Shaft	8-3/2	A1	2
33115555-2009	Retaining Ring, Ext. 0.185 Shaft	8-2	A1	1
33115555-2009	Retaining Ring, Ext. 0.185 Shaft	8-4	A10	1
33115555-2013	Retaining Ring, Ext. 0.250 Shaft	8-2	A2	1
33150000-2009	Dowel Pin, 0.062 Dia x 0.250 in. Lg.	8-3/1	3.3	6
33490001-2009	Eyelet, Flange	8-7	A1	4
33490001-2014	Eyelet, Flange	8-9	80	2
33922061-2001	Set-Screw, Cup Point, #6-32 x .187 in. Lg.	8-4	A11	1
34000079-2001	Nut, Hex, Nylon #5-40	8-5	9.2	1
34000105-2001	Screw, Self Threading #6-32	8-5	A3	1
34000190-2017	Washer, Spring #1/4 x 0.49 O.D.	8-3/1	6	1

PART NUMBER	DESCRIPTION	FIGURE NUMBER	INDEX NUMBER	QTY.
34000202-2001	Screw, Hex Hd. #8-32 x .25 in. Lg.	8-5	A1	2
34000205-2003	Screw, Round Head, #2 x .25 in. Lg.	8-3/1	2.3	3
34000352-2022	Screw, Fillister Hd. Slotted M2 x 8 mm Lg.	8-4	A9	2
34000359-2087	Screw, Fillister Head, Slotted M2.5x10 mm Lg.	8-9	43	4
34000451-2056	Washer, Split Lock, Ext. Tooth M4	8-5	A2	2
34000452-2003	Washer, Flat, M2	8-4	A7	2
34000453-2003	Washer, Flat, M2.5	8-9	40	6
34000454-2003	Washer, Split Lock, M2.5	8-9	41	4
34000455-2003	Washer, Split Lock, M2.5	8-2	A4	2
34000455-2003	Washer, Split Lock, M2.5	8-4	A8	2
34000651-2003	Nut, Hex, M2.5	8-9	42	4
34004407-2001	Screw, Cruciform Head .50 in. Lg.	8-4	A1	2
34136237-2002	Screw, Cap, Hex Head, #8-32 x .72 in. Lg.	8-4	A4	2
34517087-2001	Screw, Pan Hd. Phillips 4-40 x .25 in. Lg.	8-2	A3	2
34527167-2001	Screw, Pan Hd. Phillips #6-32 x .50 in. Lg.	8-3/1	A2	2
34527167-2001	Screw, Pan Hd. Phillips #6-32 x .50 in. Lg.	8-6	A3	3
34825007-2001	Washer, Split Lock, Int. Tooth, #6	8-6	A2	3
34828007-2001	Washer, Split Lock, #6	8-3/1	A3	2
34838007-2001	Washer, Split Lock, #8	8-4	A5	2
34912087-2001	Washer, Flat, #4	8-4	A2	2
34922105-2001	Washer, Flat, #6	8-6	A1	3
34922107-2001	Washer, Flat, #6	8-3/1	A4	2
34933126-2001	Washer, Flat, #8	8-4	A6	2
35202316-1007	IC ROM 2316	8-9	67	A/R
35205550-1900	I.C., Linear Timer 555	8-9	17	1
35207800-1900	I.C., Voltage Regulator 7805	8-9	51	2
35207812-1900	I.C., Voltage Regulator +12V 7812	8-9	52	1
35474040-1900	I.C., Hex Inverter 7404	8-9	21	3
35474070-1900	I.C., Hex Buffer/Driver 7407	8-9	19	2
35474320-1900	I.C., Quad OR 2-Input 7432	8-9	65	1
35474740-1900	I.C., Dual D-Type FF 7474	8-9	20	2
35578156-1001	I.C., 2048-B RAM 8156	8-9	68	1
35674174-1900	I.C., Hex D-Type FF 74LS174	8-9	61	1
35674273-1900	I.C., Octal D-Type FF 74LS273	8-9	18	1
36000045-2001	Bushing Nylon 0.252 I.D.	8-5	5	2
36350009-2001	O-Ring 0.921 I.D.	8-3/1	3.2	6
36350010-2001	O-Ring 0.114 I.D.	8-5	9.5	1
36350051-2001	Bumper, 0.12 in. x 0.50 in.	8-6	6	4
36700028-2002	Spring	8-2	5	1
36700033-2001	Spring Ext. 0.18 Dia. x 0.62 in. Lg.	8-3/2	5	2
37810690-1001	Crystal 6 Mz	8-9	44	1
38040020-1900	Semicond Diode TBAX IN4002	8-9	45	6
38045400-1900	Semicond Diode Rect. IN5400	8-9	2	4
38052370-1900	Semicond Diode TBAX 8.2 IN5237	8-9	3	1
38100211-1001	Semicond LED w/Leads	8-9	38	1
38100904-1900	Semicond Diode TBAX	8-9	4	5

PART NUMBER	DESCRIPTION	FIGURE NUMBER	INDEX NUMBER	QTY.
38201200-1900	Semicond, XSTR, NPN, Pwr, TIP120	8-19	14	1
38201252-1900	Semicond, XSTR, PNP, Pwr, EP3011	8-9	15	1
38239040-1900	Semicond, XSTR GP 2N3904	8-9	13	2
38239060-1900	Semicond, XSTR, PNP, GP, 2N3906	8-9	12	4
38245062-1900	Semicond, XSTR 2N5062	8-9	16	2
38263880-1900	Semicond, XSTR, NPN, Pwr, 2N6388BT	8-9	11	8
39030000-1001	Fuse Glass .25 Dia 1 Amp Slow Blow	8-9	84	1
39090010-1001	Switch, PC Right Angle Mount, SPDT	8-9	26	2
39092508-1001	Switch Block, 4 Position	8-9	77	1
39660041-1001	Cord, 18 AWG, 6 Ft.	8-9	82	1
39695333-2002	Strap Cable	8-9	81	1
41000926-1001	Resistor, Carbon, 0 Ohm, 1/4W, 10%	8-9	25	1
41103926-1001	Resistor, Carbon, 10K Ohm, 1/4W, 10%	8-9	62	15
41102926-1001	Resistor, Carbon, 1K Ohm, 1/4W, 10%	8-9	53	19
41122925-1001	Resistor, Carbon, 1.2K Ohm, 1/4W, 5%	8-9	56	1
41151926-1001	Resistor, Carbon, 150 Ohm, 1/4W, 10%	8-9	76	1
41152926-1001	Resistor, Carbon, 1.5K Ohm, 1/4W, 10%	8-9	70	1
41155926-1001	Resistor, Carbon, 1.5M Ohm, 1/4W, 10%	8-9	63	1
41201926-1001	Resistor, Carbon, 200 Ohm	8-9	71	1
41222925-1001	Resistor, Carbon, 2.2K Ohm, 1/4W, 5%	8-9	24	3
41271926-1001	Resistor, Carbon, 270 Ohm, 1/4W, 10%	8-9	22	2
41472926-1001	Resistor, Carbon, 4.7K Ohm, 1/4W, 10%	8-9	54	4
41821926-1001	Resistor, Carbon, 820 Ohm, 1/4W, 10%	8-9	69	8
46101502-1001	Pot Single Turn 1K	8-9	23	1
62000111-3001	Warning Decal Fuse Rating	8-9	46	1
62001100-5005	FF Head Assembly, 7 Wire Flex Circuit	8-4	1	1
63669022-2001	P.C.B. Artwork Logic	8-9	1	1
63669142-2001	Shaft, Carriage	8-3/1	8	1
63669142-2001	Shaft, Carriage, Upper	8-3/2	1	1
63669167-2001	Roller	8-3/2	13.1	12
63669183-2001	Side Plate, Right Hand	8-5	7	1
63669185-2001	Gear Cluster, 16/60	8-4	12	1
63669186-2001	Gear Cluster, 16/56	8-4	14	1
63669187-2001	Side Plate, Left Hand	8-5	2	1
63669190-2001	Ratchet Pawl	8-5	6	1
63669196-2001	Roller, Detent	8-3/2	7	1
63669197-2001	Bracket, Detent	8-3/2	8	1
63669202-2001	Shaft, Yoke Pivot	8-3/2	12	1
63669205-2001	Clip, Spring	8-5	1	1
63669208-2001	Ribbon Roller, Driven	8-2	3	1
63669209-2001	Ribbon Stripper, Drive	8-2	1	1
63669210-2001	Pivot, Ribbon Stripper	8-2	4	1
63669235-2001	Yoke	8-3/2	13.3	3
63669236-2001	Pawl Guide, Molded	8-5	8	1
63669240-2001	Rack, Carriage, Molded	8-3/1	7	1
63669242-5201	Body Cover	8-2	6	1

PART NUMBER	DESCRIPTION	FIGURE NUMBER	INDEX NUMBER	QTY.
63669243-5070	Base Cover	8-6	1	1
63669254-5001	Assembly, Paper Pinch Rollers	8-3/2	13	3
63669255-2001	Full Pan, Paper Feed	8-3/2	2	1
63669256-5001	Assembly, Side Plate Right	8-3/1	4	1
63669258-2001	Cam, Release	8-3/2	10	1
63669259-2001	Release Lever	8-3/2	3	1
63669260-2001	Shaft, Release Lever	8-3/2	3	1
63669262-2001	Cam, Head Gap Adjustment	8-4	3	1
63669263-2001	Pinion, Motor	8-4	10.2	1
63669264-4001	Assembly, Motor Drive	8-4	10	1
63669266-2001	Gear, Rotor	8-4	13.1	1
63669267-5001	Assembly, Rotor	8-4	13	1
63669271-4001	Assembly, Ribbon Drive Motor, 60 Hz	8-2	8	1
63669276-5001	Assembly, Side Plate, Left	8-3/1	1	1
63669278<5001	Assembly, Head/Carriage	8-3/1	9	1
63669279-2001	Head Adapter	8-4	2	1
63669280-2001	Ribbon Roller, Driver	8-2	2	1
63669287-4001	Assembly, Solenoid	8-5	9	1
63669288-2001	Paper Roller	8-3/1	3.1	1
63669290-2001	Holder, Paper Roll	8-7	4	1
63669291-2001	Dancer Bar	8-7	6	1
63669292-2001	Axle, Roller Paper	8-7	2	1
63669293-2001	Hub, Roll Paper	8-7	3	2
63669294-2001	Spring, Dancer	8-7	1	2
63669295-2001	Magnetic Rotor, Large Hex	8-4	13.2	1
63669303-2001	Spring, Detent	8-3/2	9	1
63669304-2001	Arm Disengagement, Right Hand	8-3/2	11	1
63669304-2002	Arm Disengagement, Left Hand	8-3/2	15	1
63669305-2001	Spacer, Paper Roller Drive	8-3/1	5	1
63669306-2001	Spring, Ribbon Roller	8-2	10	1
63669311-2004	Shaft, Ribbon Roller/Insert	8-4	4	2
63669313-2001	Washer, Hinge Pin	8-5	4.2	2
63669315-2001	Ribbon Roller Head Adapter	8-4	6	2
63669316-2001	Bushing, Eccentric Carriage	8-4	16	1
63669319-2001	Button, Ribbon	8-2	12	1
63669320-2001	Bearing, Thrust	8-2	9	1
63669321-2001	Pin Ribbon Roller	8-4	5	2
63669322-2001	Shaft, Roller	8-3/2	13.2	6
63669326-2001	Cap, Base Cover	8-6	9	1
63669327-2001	Holder, Sensor	8-4	11	1
63669330-2001	Adapter, Flex Circuit	8-4	7	1
63669338-4001	Assembly, Ribbon Cable 7 Wire Hd.	8-4	15	1
63669342-2001	Bumper Pad	8-5	3	2
63669348-2002	Shield, High Voltage	8-6	3	1
63669349-3001	Label, Power	8-6	7	1
63669350-3001	Label, Reset	8-6	10	1

PART NUMBER	DESCRIPTION	FIGURE NUMBER	INDEX NUMBER	QTY.
63669379-2001	Spring, Blocker	8-3/2	6	1
63669380-6001	Kit, Capacitor Metric Thread	8-9	5	1
63669382-2001	Foam, Top Cover, Front	8-8	1	1
63669383-2001	Foam, Top Cover, Middle	8-8	2	1
63669384-2001	Foam, Top Cover, Rear	8-8	3	1
63669385-2001	Blocker, Line Feed	8-3/2	14	1
63669388-2001	Foam, Body Cover, Side Corner	8-8	5	1
63669389-2001	Foam, Body Cover, Front Middle	8-8	10	1
63669390-2001	Foam, Body Cover, Left Front Corner	8-8	11	1
63669390-2002	Foam, Body Cover, Right Front Cover	8-8	4	1
63669391-2001	Foam, Body Cover, Side	8-8	6	1
63669392-2001	Foam, Body Cover, Front	8-8	13	1
63669393-2001	Foam, Body Cover, Top	8-8	14	1
63669395-2001	Foam, P.C. Board	8-6	4	1
63669400-2001	Foam, Base, Left Front Corner	8-8	16	1
63669401-2001	Foam, Base, Left Front, Left Middle	8-8	17	1
63669402-2001	Foam, Base, Right Front, Right Middle	8-8	18	1
63669403-2001	Foam, Base, Right Front Corner	8-8	19	1
63669406-2001	Foam, Base, Left Rear Corner	8-8	20	1
63669407-2001	Foam, Base, Left Rear	8-8	21	1
63669407-2002	Foam, Base, Right	8-8	22	1
63669408-2001	Foam, Base, Right Rear Corner	8-8	23	1
63669412-2001	Heat Shield, Transformer	8-6	8	1
63669421-4000	PCB, 730 Logic w/Condensed Basic	8-9	85	1
63669427-2001	Hinge Pin	8-5	4.1	2
63669437-2001	Pin, Hinge, Ribbon Tensioner	8-2	7.3	1
63669438-5001	Assembly, RTP Switch	8-9	72	1
63669439-2001	Tensioner, Ribbon	8-2	7.2	1
63669441-2001	Bracket, Ribbon Tensioner	8-2	7.1	1
63669448-2001	Spring, Ribbon Tensioner	8-2	7.4	1
63669450-5001	Assembly, Ribbon Tensioner	9-2	7	1
63669480-2001	Shield, Transformer	8-6	5	1
63669503-4002	I.C. Assembly 8049	8-9	48A	A/R
63669503-4003	I.C. Assembly 8039	8-9	48	1
63669515-4001	PCB, Flyback Protect Bd.	8-9	86	1
63669555-5001	Assembly, Carriage and Shafts	8-4	8	1
63669557-2001	Clevis Pin, Solenoid	8-5	10	1
63680115-5001	Assembly, Pin Feed Rollers	8-3/1	3	1
63680117-2001	Roller Drive Tractor	8-3/1	3.4	2
63680137-2001	Foam, Body Cover, Pulley Side	8-8	12	1
63680138-2001	Foam, Body Cover, Rear Corner	8-8	7	1
63680139-2001	Foam, Body Cover, Middle	8-8	15	-
63680140-2001	Foam, Rear Corner, Pulley Side	8-8	8	1
63680141-2001	Foam, Body Cover, Front Corner	8-8	9	1
63680168-2001	Stripper, paper, Pinned	8-3/1	2.2	1
63680169-2001	Platen, Hex, Pinned	8-3/1	2.1	1

PART NUMBER	DESCRIPTION	FIGURE NUMBER	INDEX NUMBER	QTY.
63680170-5001	Assembly, Hex Platen Pinned	8-3/1	2	1
63701468-6003	Kit, Zip-Pack, 12 Ribbons	8-2	11	-
81700332-2001	Paper Guide	8-7	5	2
XXXXXXXX-XXXX	P.C.B. 730 Logic	8-6	2	1

APPENDIX A
ADJUSTABLE PIN - FEED DRIVE ROLLER

PURPOSE - The new Adjustable Pin - Feed Roller accommodates variations in width dimensions between pin-feed holes of fan-fold paper.

DESCRIPTION - Refer to Figure 1 (detail in Figure 2, reverse side). The Adjustable Pin-Feed Drive Roller has adjustable rings and tension springs at each end. The tension springs ensure pin-to-pin distance, once set by the operator. The Drive Pin Rings move longitudinally while retaining proper pin alignment. Each Adjustment Ring has eight fixed positions, allowing fine adjustment of pin-to-pin distance.

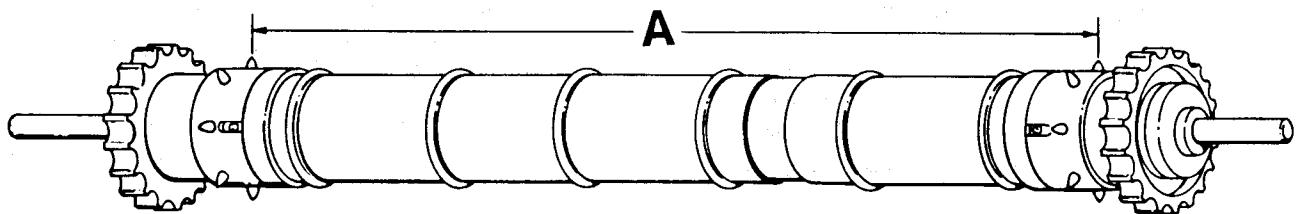


Figure 1. ADJUSTABLE PIN-FEED DRIVE ROLLER

DIMENSION "A" (Home Position)*

- o Short Version (P/N 63669489-5001) 228 mm ± 1 mm
- o Long Version (P/N 63669489-5002) 238 mm ± 1 mm
- o See Figure 2 for "Home Position"

DIRECTIONS - Refer to Figure 2. To adjust the pin-to-pin distance to accommodate the fan-fold paper, perform the following:

1. Place front panel switch in the OFFLINE position and turn power OFF.
2. Remove the power plug from wall outlet.
3. Remove top cover from printer.
4. Grasp Drive Pin Ring and Adjustment Ring at one end of roller and slide toward end of roller.
5. With spring compressed, rotate Adjustment Ring (with slots) to reposition the drive pins...
 - o Move to a deeper slot to reduce pin distance.
 - o Move to a shallower slot to increase pin distance.
 - o Repeat at other end of roller if necessary.

NOTE

The shaded area in Figure 2 illustrates the "HOME" position (228.6 mm or 9" for short version; 238.6 mm or 9.4" for long version). The printer is shipped from the factory set in the "HOME" position.

CAUTION

Index pin MUST stay in Drive Pin Ring slot. Make certain that Cam Pin falls into Cam Slot.

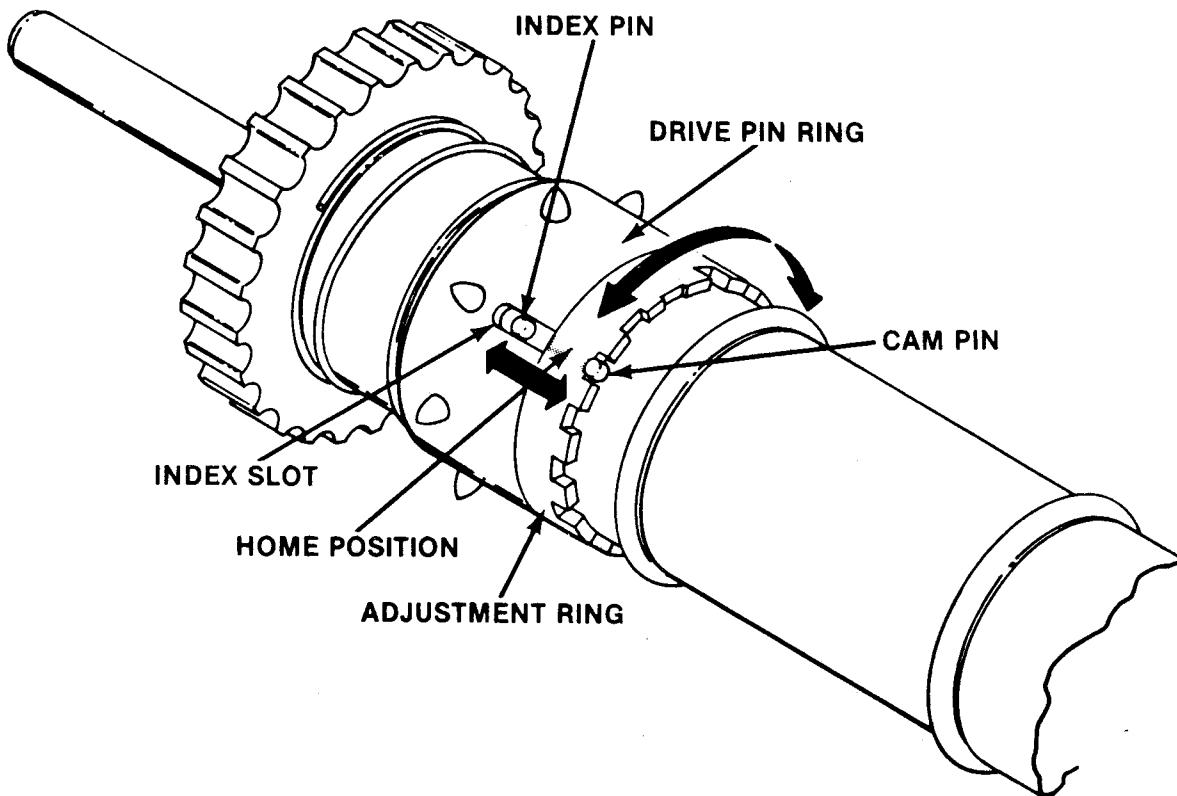


Figure 2. ADJUSTABLE DRIVE ROLLER DETAIL

ILLUSTRATED PARTS BREAKDOWN - The new Adjustable Pin-Feed Drive Roller is broken down as follows:

ITEM	PART NUMBER	DESCRIPTION	QTY.
1	63669489-5001	Assembly, Adj. Pin Feed Roller, Short	1
NOTE: This assembly is made up of items 1.1 through 1.7.			
1.1	63669476-2001	Endcap, Drive Roll, Adj. Pin	2
1.2	63669486-2001	Paper Roller, Short	1
1.3	36350009-2001	O-Ring 0.921 O.D.	6
1.4	33150000-2010	Dowel Pin	10
1.5	63669485-2002	Adjustment Ring	2
1.6	63669484-2001	Drive Pin Ring	2
1.7	63669488-2001	Comp. Spring, Pin Feed Ring	2

ITEM	PART NUMBER	DESCRIPTION	QTY.
2	63669489-5002	Assembly, Adj. Pin Feed Roller, Long	1
NOTE: This assembly is made up of items 2.1 through 2.7.			
2.1	63669476-2001	Endcap, Drive Roll, Adj. Pin	2
2.2	63669486-2001	Paper Roller, Long	1
2.3	36350009-2001	O-Ring 0.921 O.D.	6
2.4	33150000-2010	Dowel Pin	10
2.5	63669485-2002	Adjustment Ring	2
2.6	63669484-2001	Drive Pin Ring	2
2.7	63669488-2001	Comp. Spring, Pin Feed Ring	2

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